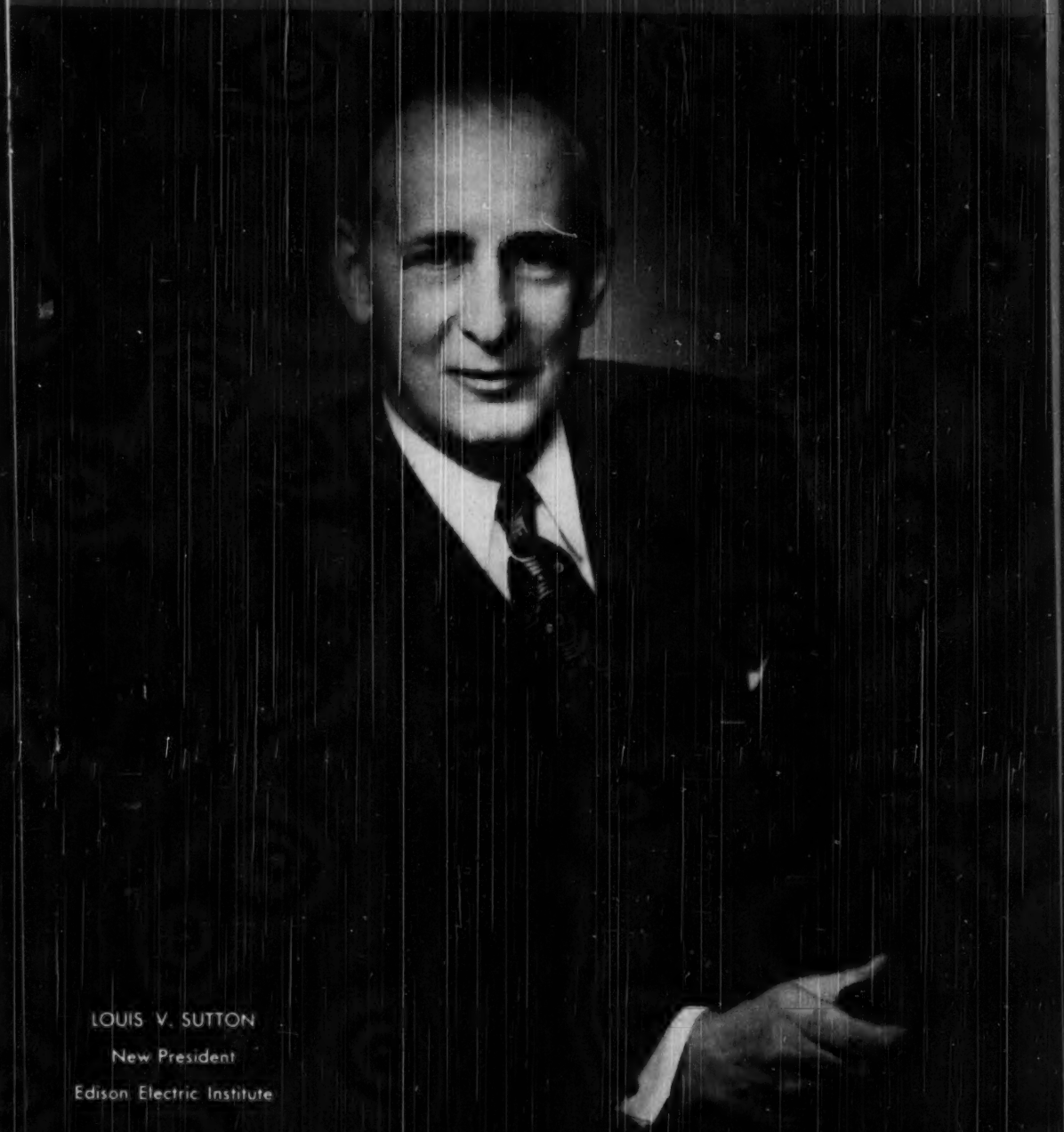
ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION

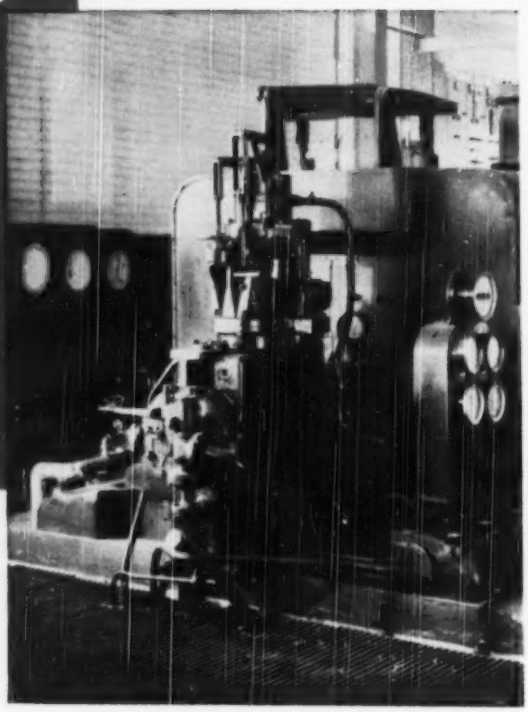
—JUNE 1951 ISSUE OF OUR 75th YEAR



LOUIS V. SUTTON
New President
Edison Electric Institute

Here's your proof of

CONSTANT TURBINE SPEED



When Texaco Regal Oils (R&O) are on the job keeping turbine systems clean

The tachometer tells the story: governors respond instantly and accurately to every load change and keep turbine speed constant . . . when you use *Texaco Regal Oils (R & O)*, the lubricants that keep circulating systems clean.

Texaco Regal Oils (R & O) are specially fortified to resist oxidation, emulsification and sludging. They contain an effective rust-inhibitor, and are processed to prevent foaming. Because *Texaco Regal Oils (R & O)* keep oil lines clean and clear, bearings get full protection . . . governors function properly.

Extra-long service life is another advantage of *Texaco Regal Oils (R & O)* . . . and these fine oils meet the exacting requirements of all leading turbine builders. Let a Texaco Lubrication Engineer help you select the *Texaco Regal Oils (R & O)* best suited to give best results under your particular operating conditions.

Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils (R&O)

FOR ALL TURBINES

OF PERSONAL INTEREST

"Thermalastic" is a new insulation material used in steam turbine generators of 12,500 kva and larger. Wrapped coils are dipped in this substance which is then baked on, and if we can believe Graham L. Moses, manager of the Development Insulation Section at Westinghouse, it provides higher power factor, greater dielectric strength and greater voltage resistance. Some other desirable characteristics are improved thermal endurance, better moisture resistance and higher chemical stability. Certainly it's a material worth your attention. The full story is in **Electrical World** for July 3rd.

DETROIT EDISON'S MULTIPLEX

Detroit Edison has made extensive use of "Multiplex Wire" to get rid of cross arms in residential districts and downtown alleys. Multiplex works like aerial cable, does away with the necessity for extensive tree trimming and gets rid of the unsightly tangle of wires and cross arms in downtown alleys. Makes a vast improvement in appearance with no sacrifice in efficiency. How Detroit Edison has used Multiplex is another feature of the July 3rd issue.

HIGH VOLTAGE TRANSMISSION

Like all experimenters in science, the men concerned with the Tidd high voltage transmission line are extremely reluctant to make conclusive statements.

Findings at Tidd will be reported in a formal paper before the AIEE summer meeting in Pasadena June 12-16, and the essence will appear in the July 3rd issue of **Electrical World.**

We can say that this report will deal with the first indication of the probability of success in transmitting voltages higher than 280,000 kv, but we're pretty sure that's as far as authors Sporn and Monteith now want to be committed. The report will hold information of interest about corona loss and radio interference.

THE AIEE MEETING

Speaking of the AIEE's summer meeting in Pasadena, **Electrical World** will provide a careful summary of all that goes on. So, if you must stay home while others bask in sunshine surrounded by gentle breezes and movie starlets, do not despair. You can be well informed on all that occurs (electrically, we mean) through **Electrical World.**

THE EDITORS

ELECTRICAL WORLD

Published for 76 years for those engaged in the business of generating, transmitting, distributing or applying electric power

VOL. 133 No. 25 · CONTENTS · June 19, 1950

Editorials 79

News: The Electrical Week · Washington Comment · Technical Notes 81

EDISON ELECTRIC INSTITUTE ANNUAL MEETING ..... 91 to 105

- Call for Action ..... By E. L. Lindseth 91
- The Electric Utility of Tomorrow ..... By C. E. Calder 93
- Developing Tomorrow's Leadership ..... B. R. J. Cordiner 94
- Is Free Enterprise Worth Saving? ..... By J. E. McCarthy 95
- Who Is Getting Hurt? ..... By W. C. Mullendore 96
- Where Are We Going? ..... By W. E. Knox 97
- The Customer, the Investor, and You ..... By C. E. Oakes 98
- Your Employees Want to Help ..... By W. E. Wood 99
- Load Building Based on Load Research ..... By F. A. Compton 100
- We Will Benefit from Soil ..... By K. Leavitt 101
- Give Farmers Their Opportunity ..... By H. W. Voorhees 102
- The Sales Job Ahead ..... By G. W. Evans 103
- Our Stake in Bituminous Coal ..... By G. H. Love 104
- Profits That Can't Be Measured ..... By W. Geist 105

Selecting Cable for Chemical Plants ..... By F. S. Gloza 106
Problem in Chemistry involved—enclosing means also a problem

Isolation Increases Rectifier Feeder Protection 109
Drawout breakers retained but feeders isolated from ground

Transient Fault Locator Proves Out ..... By L. R. Spaulding 110
Echo-ranging used with phase-selecting relays, single dc pulse

Departments

How To	114	Manufacturers and Markets	204
Engineering Reference Sheets	120	New Electrical Construction	208
Load Building	134	Catalogs and Bulletins	212
New Equipment	140	Technical Literature	214
News About People	196	Index of Advertisers	217
Letters	222		

Cover: EEI's new president, Louis V. Sutton of Carolina Power and Light Co. Portrait by Fabian Bachrach.

RALPH H FLYNN, Publisher FISCHER BLACK, Editor DANIEL T BRAYMER, Managing Editor

ARCHER E KNOWLTON ..... Senior Associate Editor
FRANK R INNES ..... Associate Editor
ROBERT C BLATT ..... Associate Editor
W B WHICHARD ..... Associate Editor
RUE M SHOOP ..... Assistant Editor
FRANCIS J KOVALCIK ..... Assistant Editor
KENNETH K KOST ..... News Editor
LOIS A STEWART ..... Assistant News Editor
JOSEPH A ROBINSON ..... Pacific Coast Editor
HOWARD S KNOWLTON ..... New England Editor
EDWARD ALLEN ..... Midwestern Editor
EARL CARVER ..... Art Editor
BERLON C COOPER ..... Lighting Consultant
GEORGE B BRYANT, JR. ..... Mgr Washington Bureau
RONALD D ROSS ..... Washington Correspondent

WORLD NEWS BUREAU, Russell F Anderson, Editor; London, Paris, Frankfurt, Moscow, Tokyo, Bombay, Melbourne, Rio de Janeiro, Buenos Aires • DOMESTIC NEWS BUREAU, Atlanta, Chicago, Cleveland, Detroit, San Francisco, Houston. Correspondents in 43 principal cities • ECONOMICS DEPARTMENT, Dexter M Keezer, Director; William F Butler, Sanford S Parker, Robert P Ulin

DISTRICT MANAGERS, E F Coffey, New York; H V Palmer, Boston; F P Coyle, Philadelphia; C R Lippold, Cleveland; P S Griffin, Detroit; W H Meneilley, Chicago; J T Schaefer, St. Louis

ELECTRICAL WORLD, Published weekly by McGraw-Hill Publishing Company, Inc. Publication Office, 99-129 North Broadway, Albany 1, N. Y., Editorial and Executive Offices, 330 West 42nd St., New York 18, N. Y. James H McGraw (1860-1948), Founder; Curtis W McGraw, President; Willard Chevalier, Executive Vice President; Joseph A Gerardi, Secretary and Treasurer; Paul Montgomery, Senior Vice President, Publications Division; Nelson Bond, Vice President and Director of Advertising; J E Blackburn, Jr, Vice President and Director of Circulation. Subscription rates: Single copy 35 cents. In the United States, $6 a year, $9 for two years, $12 for three years. Canada, $7 for one year, $11 for two years, $14 three years. (Canadian money, at par.) Pan-American countries, $15 for one year, $25 for two years, $30 for three years. All other countries $20 for one year, $30 for two years; $40 for three years. Entered as second-class matter, November 16, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Copyright 1950, by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents. Cable address McGRAW-HILL, New York. Member ABP, Member ABC.

THERE'S AN OKOVAR Varnished Cambric CABLE

Proved BEST by Time and Test

There is a complete line of Okonite *Okovar* varnished cambric cables—designed to give longer life, under high operating temperatures, in a wide range of applications. For special purposes, Okonite offers almost unlimited possibilities in Okovar cable design—in sizes and types of conductors, methods of shielding, assembling and types and combinations of coverings.

Regardless of type of construction, there is maximum stability and long life in every Okovar cable. Besides meeting all the IPCEA requirements for varnished cambric cables, Okovar must pass even more rigorous testing by Okonite research engineers. For example, Okovar cable designs are pre-tested under long-time heat tests in constant temperature ovens for months—even years—under conditions much more severe than would be found in field service.

Look to Okonite for electrical cables of the highest possible quality—designed to fulfill your exact requirements with the greatest overall economy.

For Answers to Questions like these:
"What's the best way to terminate V.C. Cable?"
"How can I safely increase the load on my present cables?"
"Will our present 2" conduits be large enough?"

Write now for Bulletin EW-1046. It's full of useful information, charts, tables and diagrams for selecting and installing the right cable for the job. The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*

Electroline Automatic Insulating Line Splice SECTIONALIZERS

2200 AND
2300 SERIES

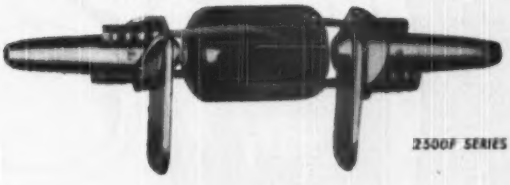
2500 SERIES

These Automatic Insulating Line Splice Sectionalizers offer a large number of line applications —at the lowest possible cost. You'll find these Electroline Sectionalizers ideal for

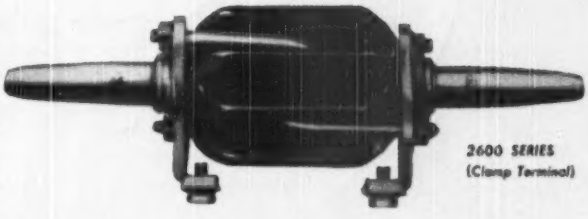
- **REGULATING SECONDARY VOLTAGES**
  Facilitates secondary voltage regulation when used to bank transformer secondaries.
- **FUSING TRANSFORMERS**
  Gives transformers real protection when used to fuse transformer leads.
- **SECTIONALIZING NETWORKS**
  Suitable for sectionalizing networks to isolate the area in trouble.
- **SERIES STREET LIGHTING**
  Simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.

The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor size for which they are adapted.

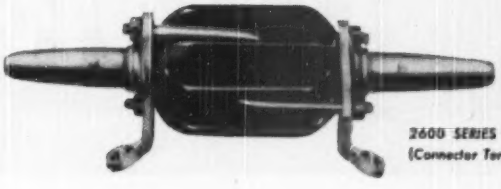
The wet process porcelain insulators used in the 2500 and 2600 series sectionalizers can, if desired, be furnished with a white glaze to reflect the beam of the lineman's searchlight when locating trouble at night.



2500F SERIES



2600 SERIES
(Clamp Terminal)



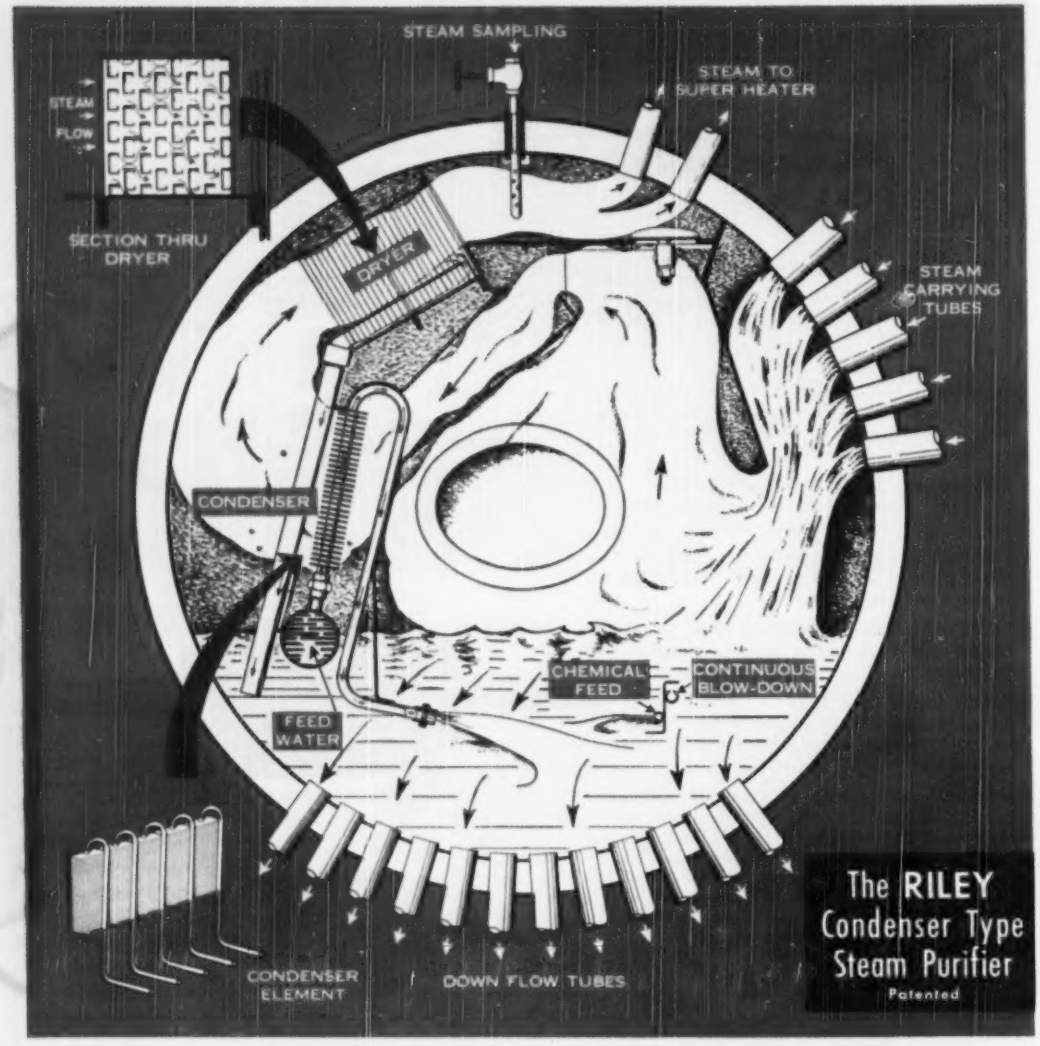
2600 SERIES
(Connector Terminal)

Send for New Bulletin

Electroline Company

4121 South La Salle Street • Chicago 9, Illinois • IN CANADA—POWERLITE DEVICES, LTD., TORONTO

Exceptional steam purity with the



RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston · New York · Philadelphia · Washington · Buffalo · Pittsburgh · Cleveland · Detroit · Chicago
Cincinnati · Atlanta · New Orleans · Memphis · St. Louis · Kansas City · St. Paul · Tulsa · Houston
Denver · Salt Lake City · Los Angeles · Portland · Seattle

BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • FLUE GAS SCRUBBERS

New Riley Condenser Type Purifier

Silica carryover reduced to minimum

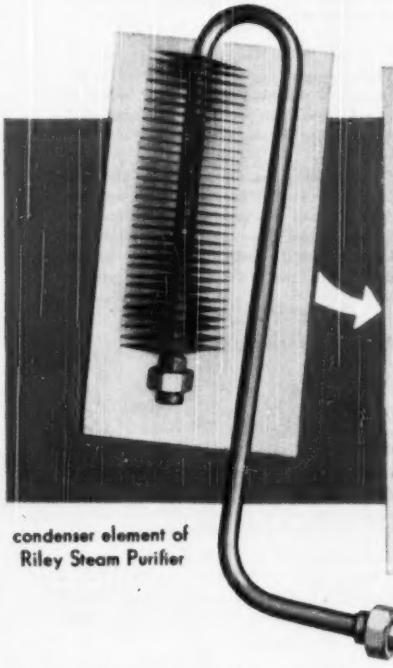
Exceptional steam purity with a minimum of silica carryover is being obtained from Riley Steam Generating Units equipped with the new Riley Condenser Type Steam Purifier. Steam purity well below 0.5 ppm is consistently obtained at installation after installation even with high percentage of make-up.

With Riley units, steam is liberated above the working water level promoting ready separation of steam and water. The condenser type purifier not only removes most of the total entrained solids from the steam but also sufficient quantities of the volatilized silica to greatly minimize difficulties from silica scale on the blades of intermediate turbine stages—an important feature with high pressure installations.

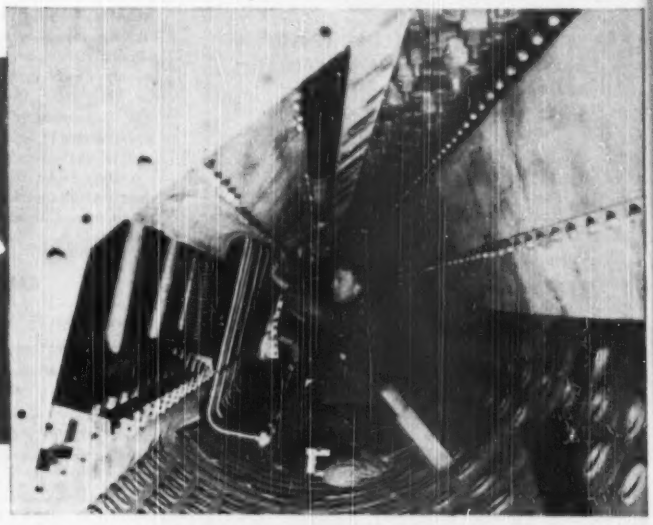
The Riley condenser type steam purifier is ruggedly constructed and securely mounted in the drum to maintain proper alignment. It occupies a minimum of internal drum space, providing ample space for inspection and cleaning of tubes connected to the drum with a minimum of dismantling. Weight of the individual purifier elements permits easy installation and removal.

Riley engineers will gladly give you detailed information about this important Riley development. Phone or drop a line to the nearest Riley office.

You Can Rely on Riley



condenser element of Riley Steam Purifier



View of Internals of Riley Steam Drum
Note ample space for inspection

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large ... costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD ... SETTINGS • AIR HEATERS

A New Fuse FOR THE NEW FUSING CONCEPT—

ANNOUNCING AT THIS TIME additional voltage ratings, a choice of time-current characteristics, and other important new features, we remind you that the SMD-2 is a modern fuse so far advanced in design that the present concepts of high voltage fuse application must be expanded if full advantage is to be taken of the economy inherent in fuse protection of transmission and sub-transmission systems.

* **FULL COVERAGE PROTECTION IS:** the new concept of transformer fusing in which:

1. A primary fuse is applied for both primary short circuit and secondary back-up short circuit protection.
2. A fuse is expected to perform dependably regardless of type of system; type of fault current; type of application; or system and atmospheric conditions.

* **FULL COVERAGE PROTECTION PROVIDES**— along with the above protection— savings in operating expense by:

1. Eliminating the need for replacement of "suspect" fuses on other phases when one fuse blows.
2. Eliminating the need for periodic replacement of fuses to prevent "sneak-outs" caused by vibration- or age-weakened fusible elements.

* **FULL COVERAGE PROTECTION REQUIRES:**

A. dependable high and low fault-current interrupting ability;
B. protection against dielectric breakdown or external flashover from severe recovery voltage;
C. a fine degree of accuracy in time-current characteristics;
D. a "non-damageable" fusible element which cannot be injured by surge currents, vibration, or aging;
E. a choice of time-current characteristics to provide flexibility in coordinating with other primary, and with the secondary, protective devices.

The SMD-2 offers short circuit interrupting capacity many have thought could only be obtained with a circuit breaker; yet it is more reliable than a breaker. And the SMD-2 costs so much less that economic necessity need no longer compel a choice between the expense of a breaker or the often used expedients of solid tie, grounding switches, or remote-trip-relay protection, when tapping transmission and sub-transmission lines.

Permanent accuracy of the SMD-2 time-current characteristics permit sufficiently close fusing of the transformer bank to get back-up protection in case of secondary bus faults or failure of secondary protective devices—and this protection is accomplished without incurring outages caused by unwanted fuse operations.

The importance of fusing for secondary protection has been demonstrated by field experience which has shown that more than half of the operations of fuses thus applied were caused by secondary faults that most certainly would have damaged or destroyed the transformers. With the SMD-2 this valuable secondary protection is obtained in addition to a full measure of primary protection.

SMD-2 HIGHLIGHTS

Voltage Range: 34,500 to 138,000.

Interrupting Ratings: to 1,000,000 KVA.

In fuses of low ampere ratings, low fault currents are positively interrupted by an auxiliary gas-blast arc extinguisher.

Drop-out release is protected against opening from vibration or shock by a floating, self-aligning, latch mechanism.

Drop-out, when intended, is assured by a powerfully spring driven pry out lever, and a "wiping-in, rolling-out" contact design.

Initial and permanent accuracy of time-current characteristics are provided by non-damageable fusible elements.

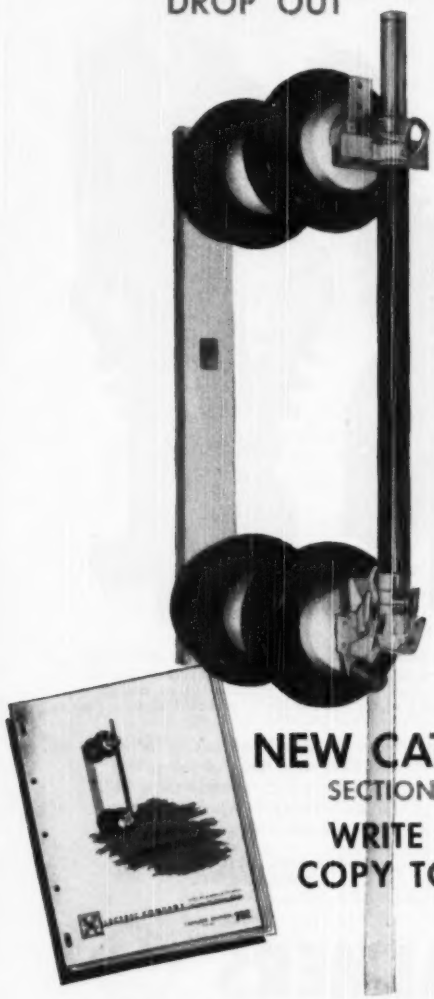
For a complete account of this new protective device you should have the new Catalog Section 262, now ready. Write for a copy today!

S&C ELECTRIC COMPANY

Formerly SCHWEITZER & CONRAD, INC.

*Full Coverage**

SMD-2 POWER FUSE
DROP OUT

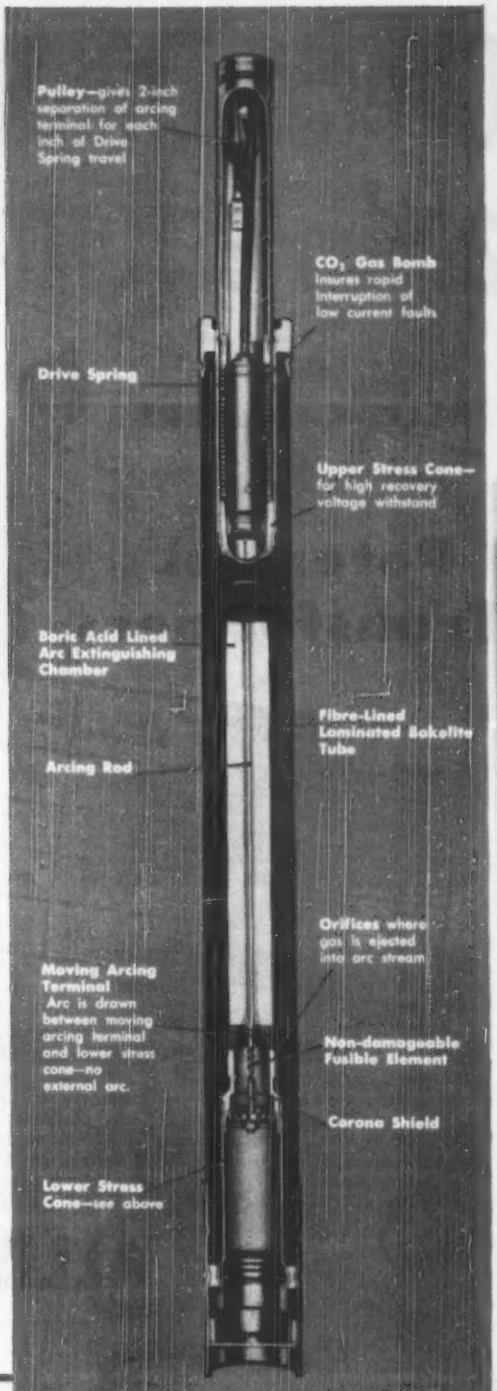


NEW CATALOG
SECTION 262

WRITE FOR COPY TODAY!

4421 Ravenswood Avenue
Chicago 40, Illinois, U. S. A.

In Canada, Powerlite Devices, Limited, Toronto


Pulley—gives 2-inch separation of arcing terminal for each inch of Drive Spring travel
CO_2 Gas Bomb insures rapid interruption of low current faults
Drive Spring
Upper Stress Cone—for high recovery voltage withstand
Boric Acid Lined Arc Extinguishing Chamber
Fibre-Lined Laminated Bakelite Tube
Arcing Rod
Orifices where gas is ejected into arc stream
Moving Arcing Terminal
Arc is drawn between moving arcing terminal and lower strass cone—no external arc.
Non-damageable Fusible Element
Corona Shield
Lower Strass Cone—see above

CUTAWAY VIEW OF FUSE UNIT

Check Thermal Capacity and Performance

OF ALLIS-CHALMERS *REDESIGNED* Potential Transformers

RATING	IMPULSE STRENGTH KV	OUTPUT AT 55°C RISE	BASE DIMENSION	HEIGHT	NET WEIGHT
SPW-2 24 KV	150	3½ KVA	14½ x 14⅝	36½	252
SPW-3 34.5 KV	200	4 KVA	15½ x 16⅝	39	310
SPW-4 46 KV	250	4 KVA	19 x 19	49	615
SPW-6 69 KV	350	6 KVA	25½ x 24	61	1050

Compactness of the type SPW transformer is illustrated above. At left is 69 kv rating; 24 kv at right. Not illustrated, but also available in all ratings, is single bushing type for line to ground connection.

MEET THE NEW, two way improved, SPW outdoor potential transformer. It's not only smaller and lighter . . . it's tougher, too!

The new SPW will handle accurate metering or relaying service even with the stiff operating burdens of sectionalizing switch motors. Insulation strength is exceptionally high. Yet the SPW is compact. For details, see table above.

Coils are protected by angles, channels and barriers of vacuum dried insulating materials. Tank is all-welded, hermetically sealed to protect all insulation and oil from oxidation and deterioration.

Contact your nearby A-C district office for details on *any* of Allis-Chalmers wide range of instrument or metering transformers. Or write for bulletin 61B7168 listing over 400 types and ratings. A-3093

ALLIS-CHALMERS, 932A SO. 70 ST. MILWAUKEE, WIS.

ALLIS-CHALMERS

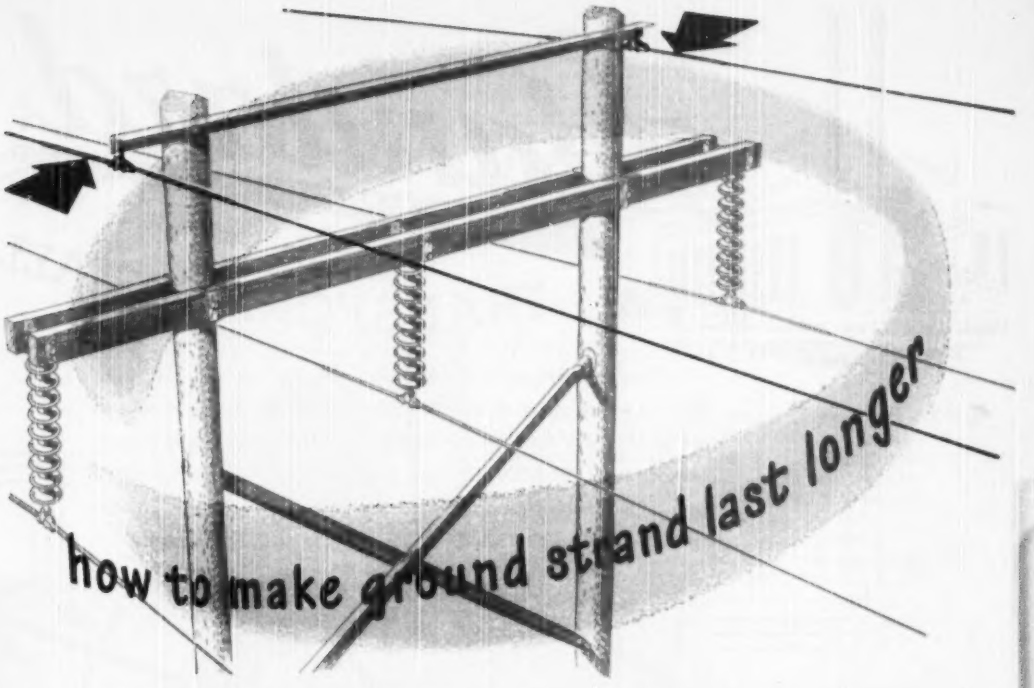
OVER 400 TYPES AND RATINGS

INDOOR CURRENT, for low voltage metering, Type KLW — 600 volts.

OUTDOOR CURRENT, for heavy duty metering; Type CWD-3 — up to 15 kv.

INDOOR CURRENT, for heavy duty metering; Type R3E — 15 kv.

INDOOR POTENTIAL, 200 VA, fused or unfused; Type PD — up to 14,000 volts.



● Unprotected ground strand (static wire) that has been in service for as little as a year, may fail at support points. That's where the bending stresses of vibration are concentrated. That's where unbalanced line tension and abrasion take their toll.

If your ground strand is in poor condition, Preformed Armor Rods afford the most economical method of making needed repairs and extending strand life indefinitely. Any lineman, regardless of his skill, installs PLP Armor Rods without tools, clips or clamps.

Every installation is perfect. The rods are machine-formed to fit the specific conductor size. That's why they grip tighter, more uniformly over the entire strand length . . . form a tight-fitting sheath that protects the strand from clamp pressure, arc-over, burning, pitting and concentrated stresses of vibration. Where one or more wires are broken, PLP Armor Rods restore the *original mechanical and electrical properties* to the strand.

Naturally, it's wise to install PLP Armor Rods on new ground strand before damage can occur. *And for that matter, more and more utilities now protect main conductors with PLP Armor Rods.*

Why not get the whole story now? For complete information, photographs and technical consultation, write PREFORMED LINE PRODUCTS COMPANY, 1051 Power Avenue, Cleveland 14, Ohio.

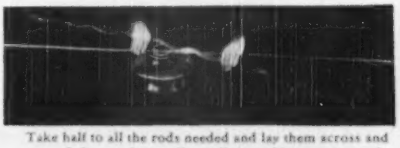
PREFORMED

Preformed armor rods are for use under patent No. 2,275,019 — other patents pending.

LINE PRODUCTS CO.

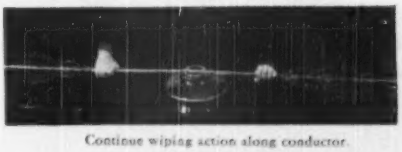
1051 POWER AVE. • CLEVELAND 14, OHIO

FOLLOW THESE SIMPLE INSTRUCTIONS

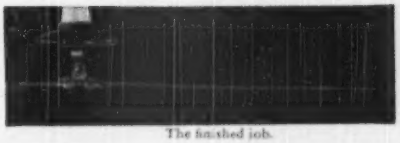


Take half to all the rods needed and lay them across and around the conductor. For splices and/or repair, apply first "half set".

Wrap around conductor several times . . . like wringing water from a cloth. Apply remainder of rods or second "half set".



Continue wiping action along conductor.



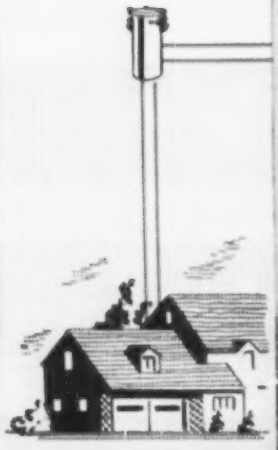
The finished job.

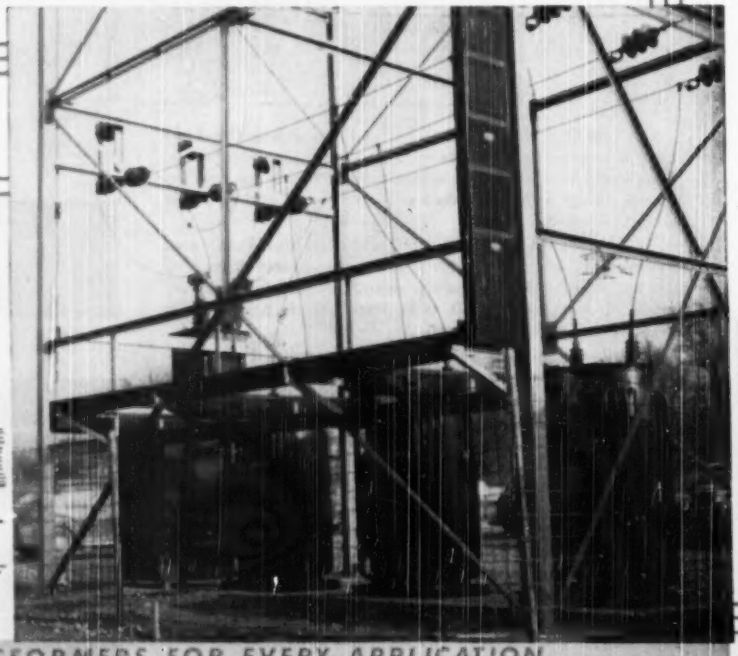
Standard

TRADE MARK ®

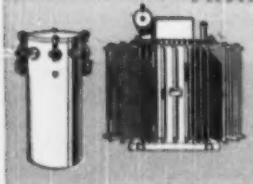
TRANSFORMERS ALL

Have the assurance of peak efficiency "all the way down the line" at every stage of voltage change from the power station to the point of use with the consistency of STANDARD'S transformer performance. STANDARD has provided the electrical industry with dependable transformers for more than 25 years. When you specify STANDARD TRANSFORMERS—you specify the best.

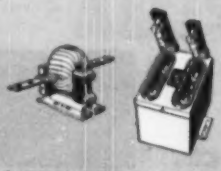




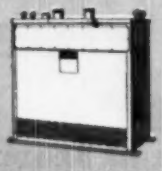
TRANSFORMERS FOR EVERY APPLICATION



Liquid filled (sizes up to 10,000 KVA and 72 KV Inc.)



Instrument transformers (for use on circuits up to 72,000 volts, Inc.)



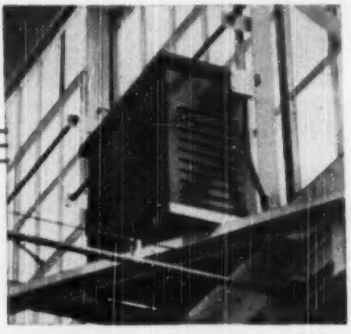
Dry type (up to 1000 KVA and max. voltage ratings of 4800)

Control transformers (compound filled or open type)

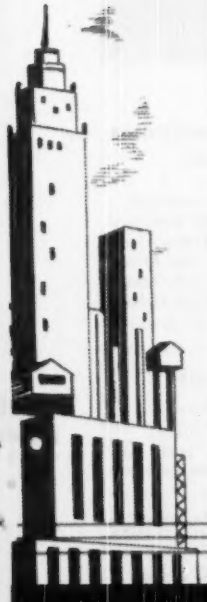
THE WAY DOWN THE LINE...

OIL, ASKAREL AIR COOLED

Accepted by people who know from experience



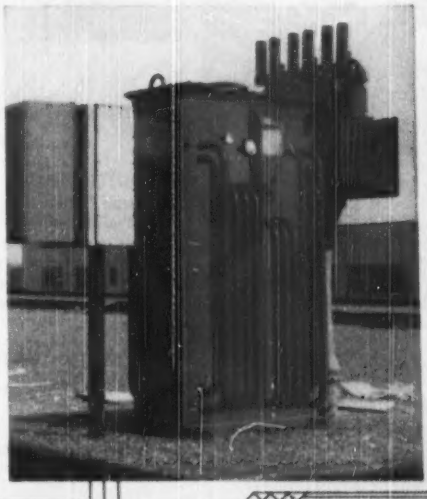
The Standard Transformer Company has the sound foundation of more than a quarter century of specialization in designing and building transformers to meet precise requirements of industries. STANDARD'S research in conjunction with the thinking of utility and industrial electrical engineers combine to produce the best possible transformers. STANDARD TRANSFORMERS incorporate every feature to provide the present day ultimate in flexibility and durability, with greatest safety.



LOAD CENTER DISTRIBUTION

Indoor Since recognition of load center economies and operational advantages is established, engineers' selection of a transformer is influenced by performance records. STANDARD'S dry-type transformers have proved practical because they lend themselves to a great variety of conditions. Built with a minimum of weight and size (consistent with power requirements and capacity margin) this STANDARD DRY-TYPE TRANSFORMER was easily and quickly installed in an out-of-the-way indoor location.

Outdoor Where space and location factors require the advantageous use of non-inflammable liquid cooled types, STANDARD'S Askarel cooled transformers are depended upon for trouble-free service. Here's a load center unit located on a roof. You can specify STANDARD with assurance that, from an engineering point of view, there is no better transformer available, and, from a manufacturing standpoint, expert craftsmanship and best grade materials are combined for quality production. Write, today, for data on any "all the way down the line" STANDARD TRANSFORMERS.



THE STANDARD TRANSFORMER COMPANY

Try the *New* DUTCH BRAND PLASTIX Electrical Tape

5
ROLLS TO
RE-USABLE
CONTAINER

Superthin Construction with High Dielectric Resistance ...Conforms readily to irregular surfaces

DUTCH BRAND PLASTIX Electrical Tape is made by the manufacturers of electrical tapes for the past forty years. It is made with a full understanding of electrical requirements. You'll find Plastix is used in those many places where space is limited and a superthin tape is needed.

DUTCH BRAND PLASTIX Electrical Tape is the result of careful study and research and meets the recognized high quality standards established by all other DUTCH BRAND electrical tapes.

FEATURES THESE MANY OUTSTANDING QUALITIES

TEARS READILY ...in spite of its strength and stretch.

CONFORMS TO IRREGULAR SURFACES ... superthin, great flexibility and stretch make excellent conformity.

RESISTS WEATHER ... rain and rough weather do not affect it ... favorably withstands relatively high or low temperatures.

RESISTS ACIDS, ALKALIES, CORROSION ... wherever present ... in chemical plants, around machinery, etc.

EXTRA-HIGH DIELECTRIC RESISTANCE ... a single thickness resists 8000 volts which is greater than 1000 volts-per mil of thickness.

EXCELLENT ADHESION ... the quality of the adhesive and the even coating assure excellent adhesion.

TENSILE STRENGTH ... it is strong ... has ample strength for all types of applications.

Order From Your Jobber

DUTCH BRAND

VAN CLEEF BROS. INC.

Manufacturers Rubber Products Est. 1910

CHICAGO 18, U. S. A.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

A Quick Changer!

. . . for fast re-fusing . . for higher capacity

Interchangeability keynotes Westinghouse porcelain-enclosed cutouts. Only Westinghouse gives you this versatility in line protection. Consider what this means:

First, fuse replacements are fast . . . safe . . . easy. Lineman removes door with hookstick—replaces it with a fused door. Fuse links can be replaced at the truck or in the shop.

Second, as line capacity outgrows the cutout interrupting rating, the EA cutout door may be replaced with the new Type HC (high interrupting capacity) door—either dropout or non-dropout type. That's because *any* door will fit *any* housing.

In addition, you get greater safety; complete hookstick operation; 180° dropout for clear indication of blown fuse; cool operation; light weight combined with great mechanical and electrical strength.

These cutouts are available now in a range of sizes to meet your requirements. See the versatility of this cutout. Ask your nearby Westinghouse representative or distributor for a personal demonstration and Booklets B-3833 and B-4299. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60705A

1. PRESTITE PORCELAIN HOUSING—50-ampere, 5-kv, identical for both Type EA and Type HC cutouts.

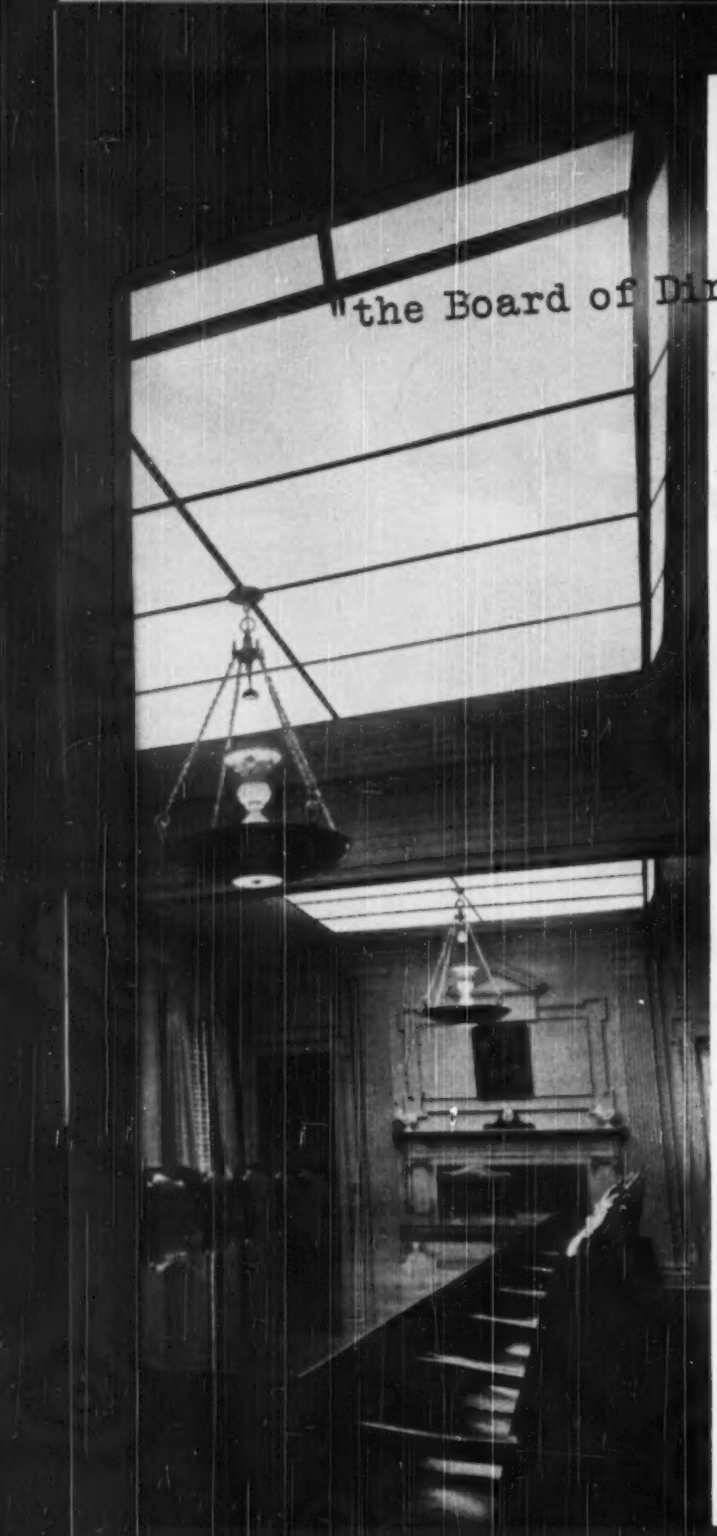
2. MOLDARTA TYPE EA DOOR—1,200-ampere interrupting capacity.

3. MOLDARTA TYPE HC DOOR—Interchangeable with Type EA cutout door. Interrupting capacity 8,000 amperes at 2,500 volts, 5,000 amperes at 5,000 volts.

Westinghouse

FUSE CUTOUTS

FOR ANY SYSTEM



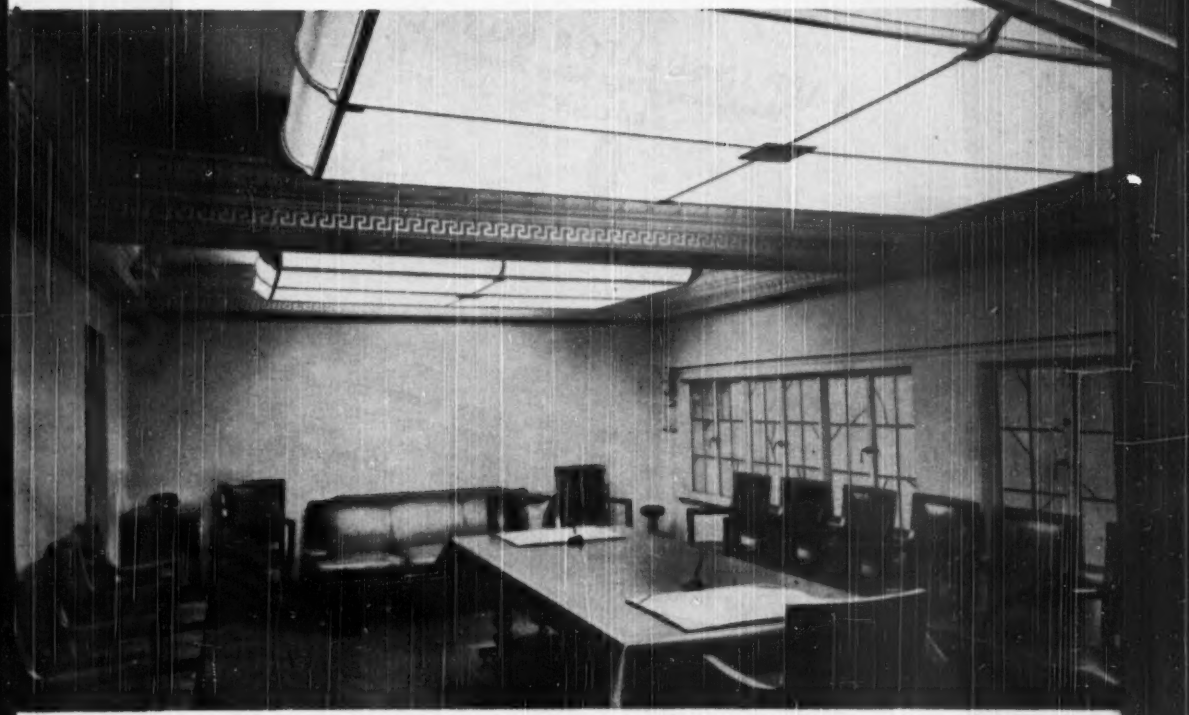
"the Board of Directors unanimously

No wonder PLEXIGLAS lighting wins approval. It provides glarefree, shadowless illumination wherever installed, from Directors' Rooms to housewives' kitchens. The full output of the lighting source is evenly diffused across the surface of this highly efficient acrylic plastic. Result: A luminous atmosphere notable for low brightness contrast and high visibility.

PLEXIGLAS aids design and installation, too. Lightness and strength mean easy erection with fewer, lighter supports. Resistance to breakage and discoloration assures low-cost maintenance. And the variety of translucency-grades in flat, patterned, or corrugated material, coupled with the ability of PLEXIGLAS to be formed readily and economically to almost any desired shape, gives almost unlimited scope to fixture design.

◀ PLEXIGLAS is used for both diffusion and reflection of light in the General Electric Company Board of Directors' Room, New York City. White translucent panels in the 9-foot-square fixtures diffuse perfectly the light from 18 slimlines mounted only 2¼" from the acrylic plastic surfaces. Lightly sanded on the outside, the panels also act as diffuse reflectors for indirect lighting from hanging fixtures that are used when the main lighting is not needed. Fixtures designed and installed by The Frink Corporation, Long Island City, New York.

approved the New PLEXIGLAS Lighting..."



PLEXIGLAS ceiling lighting fixtures in the Directors' Room of Cleveland's Bank of Ohio produce an average illumination of 75 footcandles on the conference table. Each fixture measures approximately 6 x 8 feet and consists of four corrugated bottom diffusing panels with curved side panels formed from 12" strips of flat material. Ten 96" 300MA G.E. Slimline and two 40-watt fluorescent lamps (mounted at right angles at the ends of the Slimlines) illuminate each fixture. All lamps are 3000°. Fixtures installed by Bell Electric Company. Design consultants: W. E. Conley, General Electric Co.; John Liston, George S. Rider Co.; W. A. Mize, Cleveland Electric Illuminating Company.

TELL US ABOUT YOUR PROBLEM

We will be glad to work with you on specific lighting applications. Write us today. Let us show you how PLEXIGLAS can provide the best answer to your lighting problem.

PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: Crystal Glass & Plastics, Ltd., 282 St. Helens Avenue, Toronto, Ont.

OPEN LETTER...TO TRANSMISSION ENGINEERS WHO "HAVE NO INSULATOR TROUBLE"

LAPP INSULATOR CO., INC.
Manufacturers of High Voltage Porcelain
LE ROY, N.Y.

What's Happened
To Transmission Line
Maintenance Records?

There was a time when just about every power company maintained complete service and maintenance records on all types of equipment on their systems---and just about every operating engineer was right up to date on the performance of equipment for which he was responsible.

It was on the basis of such records of performance of high voltage insulators that we introduced---and sold hundreds of thousands of---the Lapp Line Post. For here was a better transmission insulator, designed and built to eliminate the shortcomings of mechanical and electrical performance which cause most insulator failures.

The pinch of a depression, followed by the all-out effort of a war, seems to have changed some habits, and some thinking. Today maintenance records---at least as regards transmission insulators---are less completely kept. And operating engineers, to whom they should be of most vital interest, don't know much about what's in them. That seems odd, because pin-type insulators aren't significantly better now than they were 20 years ago. On every pin-type transmission line in America, rather large numbers of the insulators have to be replaced every year.

We know a lot of transmission engineers who, without having looked at the maintenance record for years, think they're "having no trouble" with pin-type transmission insulators on their lines. Whenever we can get one of these fellows to dig out the record...count up replacements of pin-type insulators during a year...and multiply by whatever he thinks is a good average cost per replacement...he's invariably shocked at what he finds this operation costs his company.

Even in companies which have both pin-type lines and Line Post lines, with records for both---and there are now many such companies---few engineers know accurately the relative performance of these lines. Yet tabulations of the records show better than a ten-to-one advantage for Line Posts.

Today, many companies have come back to cost-consciousness. We suggest that in many of these companies there's a great big chunk of unsuspected but none-the-less unnecessary expense right in this transmission insulator replacement business.

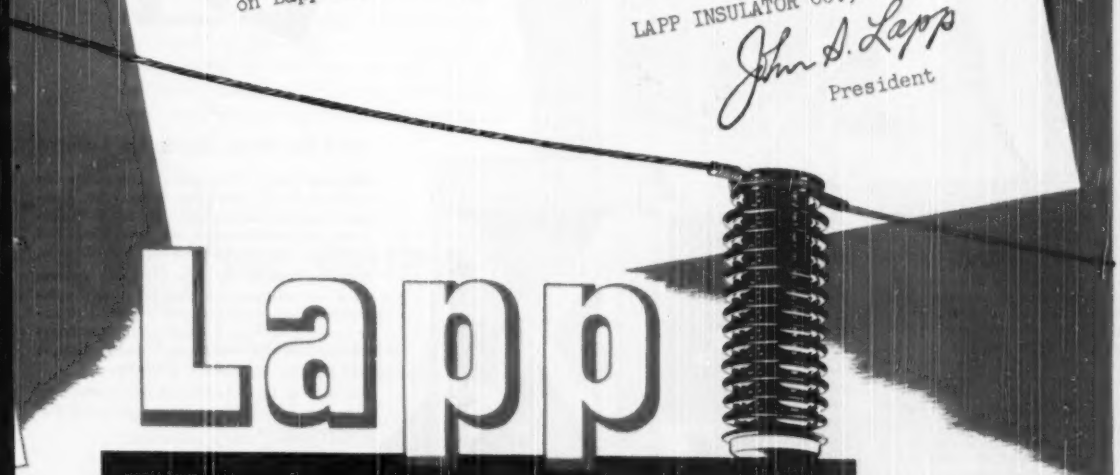
It might even be that you could earn your company a few thousand dollars an hour for the effort involved in digging out your own transmission insulator replacement costs. You'll find the savings start as soon as you standardize on Lapp Line Posts.

Sincerely yours,

LAPP INSULATOR CO., INC.

John A. Lapp

President



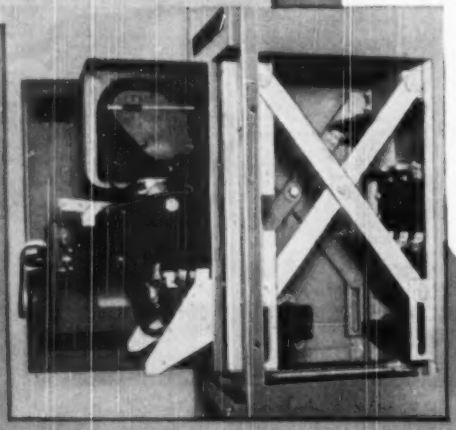
Lapp

LAPP INSULATOR COMPANY INC. LEROY, NEW YORK

Here's the best

I-T-E MULTUMITE SWITCHGEAR FEATURES EASIER ACCESS TO BREAKERS!

On both high- and low-voltage Multumite Switchboards, the easy-to-remove breakers are guided by maintenance men. I-T-E 5KV Breakers are truck-mounted for quick, easy withdrawal from compartments. Low-voltage I-T-E Breakers are pantograph-mounted, and all components are accessible when breaker is withdrawn. In the fully withdrawn position, breaker can easily be removed; the metal feet on its base make it a self-standing unit. Both HV and LV breakers may be tested while still in their compartments.



Send for these descriptive bulletins

BULLETIN 6003-D: A complete reference guide to I-T-E 600V Switchgear assemblies. Contains detailed information on I-T-E Multumite and helpful facts for specifying and ordering complete switchgear installations.

BULLETIN 7000-A: Describes I-T-E's newest 5KV Switchgear — illustrated and supplemented with practical, easy-to-read drawings and diagrams. If you have any questions on modern HV switchgear construction, it will pay you to have this bulletin.

Get both of these helpful bulletins now. Ask your local I-T-E Representative or write I-T-E General Offices.

way to order electrical protection

Let I-T-E supply the complete job!

You'll discover how easy—and economical—solving electrical distribution problems actually is when you put the I-T-E organization to work for you. I-T-E furnishes everything you need in engineering and equipment. For instance, here's what you get when I-T-E supplies your switchgear:

• PROPER APPLICATION FOR YOUR SPECIFIC NEEDS: Every I-T-E Sales Engineer is a *switchgear specialist*—fully qualified to assist you in planning all parts of your distribution system. Thus, your I-T-E Switchgear is designed for your specific problems—built to meet your needs!

• EFFECTIVE, PROPERLY COORDINATED UNITS: I-T-E supplies the finest components for every part of your distribution system. I-T-E's own equipment is designed better to last longer. Purchased auxiliaries must meet highest standards of excellence. And all components are coordinated by I-T-E's engineers into efficient, functional units of maximum dependability.

• QUICK, EASY INSTALLATION: Your I-T-E equipment is completely assembled and tested by I-T-E *before* shipment. It is delivered to you, ready for connections. Installation is simplified; chances of failure because of improper assembly are minimized.

• A SYSTEM THAT'S EASY TO OPERATE, EASY TO MAINTAIN: All components of I-T-E units are functionally arranged for easy, simple operation. And your maintenance men will be enthusiastic when they see how much more *accessible* I-T-E units are. Inspections and maintenance are easier, take less time!

• IT'S EASY TO ORDER, WITH QUALITY GUARANTEED! A *single* order is all it takes for a *complete* I-T-E job—from the simplest panelboard, to everything necessary for a complete distribution system. I-T-E designs, builds, and ships your job as a "package"—and accepts complete responsibility for the operation and performance of every component!

Extra service and extra quality—which you get without extra cost—make I-T-E your best switchgear buy!

I-T-E **For *more dependable* Switchgear**

specify I-T-E!

I-T-E Circuit Breaker Company
19th & Hamilton Streets, Philadelphia 30, Pa.

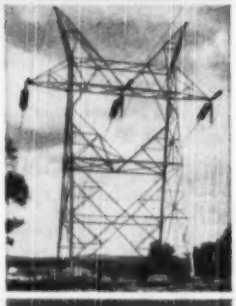
Power Switching Equipment Division: Railway & Industrial Engineering Co., Greensburg, Pa.
Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto
Export Sales: Philips Export Corp., New York

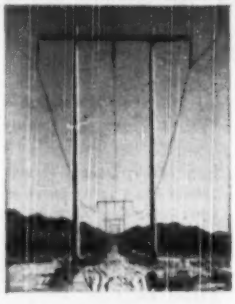
SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES
CIRCUIT BREAKERS • MECHANICAL RECTIFIERS • RESISTORS
SPECIAL PRODUCTS

HIRED! A field man

FOR YOUR GOOD RELATIONS DEPARTMENT

Highest Quality Wet-Process Porcelain Shells made on the industry's finest automatic, completely hydraulic presses to assure uniformity and dependability in ALL units.





Not all good relations with the public are confined to the home office. Basically, it starts with the kind of equipment you use. Power failures won't make friends—only influence people to say adverse things about your service. Stay on the "Good" side of Good Relations. Buy Porcelain Products' dated, performance tested suspension insulators. They're built to keep working under the most extreme weather conditions. Write for prices and catalog information on our High Voltage Insulator line.

Porcelain Products, Inc.

PARKERSBURG, WEST VIRGINIA

EXPORT REPRESENTATIVE:

Philips Export Corp., 100 E. 42nd St., New York 17, N. Y. U. S. A. Cable Address: "PHILYORK"

Service Restored

faster than ever after ice storm . . .

ICE storms are a utility's nightmare. Recently, the Missouri Public Service Corporation had a beauty on its hands. Driven by high velocity winds, heavy sleet lashed trees and roads, coated them with 6 to 8 inches of ice, pulled down hundreds of miles of line in the 17-county service area.

Thanks to *instant communication* made possible by General Electric 2-way radio in line trucks and supervisors' cars, service was restored at least 3 to 4 days earlier than would have been possible without the use of radio, according to officials at company headquarters in Warrensburg.

Utilities in every state use G-E 2-way radio to coordinate planned interruptions, to save manhours, truck hours, time on outages. Let our engineers study your communication problem, too—there's no obligation. Write: *General Electric Company, Section 2050, Electronics Park, Syracuse, New York.*

YOU BE THE JUDGE — CHECK THESE ADVANTAGES

Equipment Features	General Electric	Manufacturer A	Manufacturer B
Triple-Tuned Transformers (high selectivity with fewer tubes)	Yes	No	No
At Least 2 Watts Peak Audio Output	Yes	No	No
Instantaneous Modulation Limiting	Yes	Yes	No
Number of Tubes	18	26	22
Cost per Set of Tubes	$24.50	$50.16	$31.79
Spurious Radiation at any frequency	65 db	60 db in the band only	60 db
Cable Junction Box	Not Required	Required	Not Required
Key Lock for Protection of Every Unit	Yes	Optional at Extra Cost	Not Available
Microphone Quick Release Plug	Yes	Not Available	Not Available
20 kc & 40 kc Receiver Selectivity	Yes	No	No
Two-Unit Design for Maximum Mounting Flexibility	Yes	No	No

You can put your confidence in—

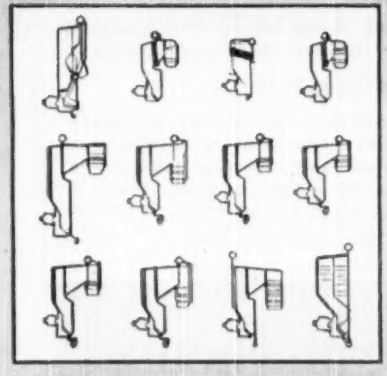
GENERAL ELECTRIC

OUTSTANDING ACCEPTANCE

Already, as shown on the chart above, B&W's revolutionary new method of coal-firing has been selected for a total of 19 boilers with aggregate steam capacity of more than 10 million pounds per hour . . . sufficient to serve over a million kw of new generating capacity. Lower boiler maintenance, greatly reduced fly-ash emission, simplified ash-handling, effective utilization of low-grade coals, safety in operation, and elimination of large and expensive auxiliary equipment, are some of the outstanding advantages that account for the immediate popularity of this amazingly better firing method.

CHARTING PROGRESS

...latest report on applications and advantages of this revolutionary firing method



RANGE OF APPLICATION

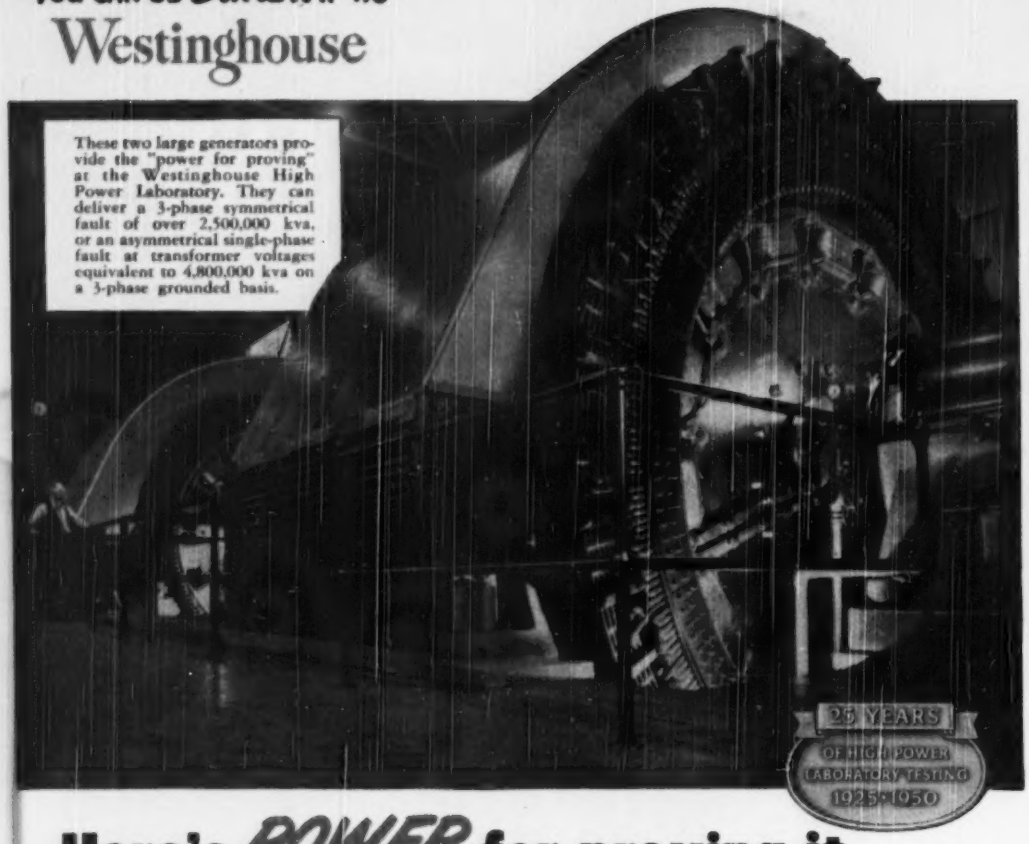
The 34 B&W Cyclone Furnaces now installed or on order are designed to serve Radiant and Open-Pass units with hourly steam capacities ranging from 180,000 to 830,000 pounds; design pressures to 2125 psi, and temperatures to 1050 F. Reheat and pressurized furnaces are other features of some of these outstanding jobs. Fuels range from North Dakota lignite to West Virginia Pocahontas, oil and gas, burned separately or in combination.

Helping Industry Cut Steam Costs Since 1867 —through Research, Engineering, Equipment, Installation and Maintenance Services.

BABCOCK & WILCOX

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



These two large generators provide the "power for proving" at the Westinghouse High Power Laboratory. They can deliver a 3-phase symmetrical fault of over 2,500,000 kva, or an asymmetrical single-phase fault at transformer voltages equivalent to 4,800,000 kva on a 3-phase grounded basis.

Here's *POWER* for proving it

Many electrical products are required to interrupt heavy currents under fault conditions . . . carry great amounts of current for a short time . . . perform consistently under repetitive short-circuit conditions. Oil circuit breakers, air circuit breakers, reactors, disconnecting switches, transformers, and many other pieces of electrical apparatus come under this classification.

That is why, 25 years ago, Westinghouse installed its High Power Laboratory at East Pittsburgh. We wanted to be sure that every piece of apparatus bearing the Westinghouse name was designed to function properly under short-circuit conditions.

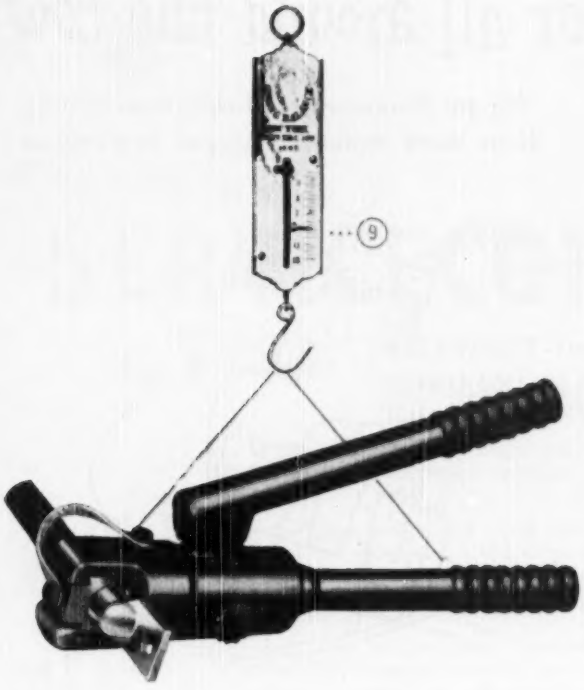
In this High Power Laboratory we have the equipment to do this . . . huge generators to develop fault currents that match those of the country's largest electrical systems, transformers that produce short-time currents to test apparatus for momentary current rushes. This is how we make *sure*...and this sureness is passed along to you.

SEE FOR YOURSELF!

Booklet B-4383 describes facilities, procedures and actual tests conducted at the Westinghouse High Power Laboratory. Ask your Westinghouse representative for a copy, or write directly to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60722

Westinghouse

HIGH POWER LABORATORY

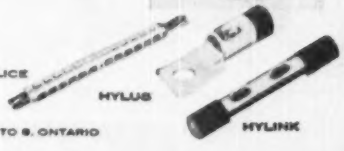


* SKEPTICS:
Young elephants weigh about 3,000 pounds each

9 pound Hypress exerts 9 ton pressure

You'd naturally expect this superior indent tool from the originators of Hydent indent connectors—Burndy! 19 inches long, light weight, handy to operate, this fully insulated hydraulic Hypress (Y34A) delivers up to 18,000 pounds of pressure with automatically controlled depth of indentation. Assures strong, efficient electrical connections every time.

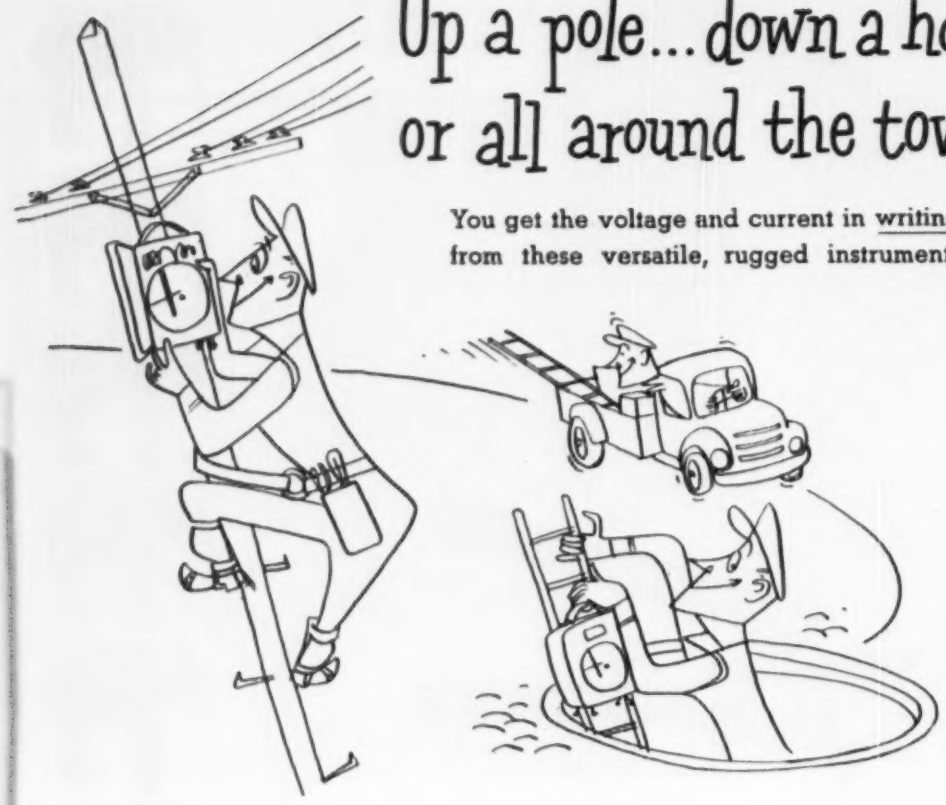
BURNDY
ELECTRICAL CONNECTORS



BURNDY, N. Y. 54 N. Y. • WESTERN BRANCH: VERNON 58, CALIF. • BURNDY CANADA LTD., TORONTO 9, ONTARIO

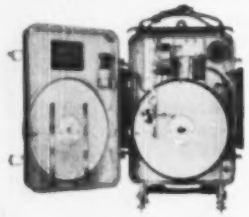
Up a pole... down a hole or all around the town

You get the voltage and current in writing from these versatile, rugged instruments



Bristol All-Purpose Recording Voltmeters and Ammeters

Lightweight and self-contained . . . all parts built for rough handling



For the most efficient operation of your electrical system, keep an eye on voltage and current.

Knowing the facts — accurate, complete, clear—you can make the necessary corrections.

Bristol's All-Purpose Recorders —with weather-proof case and light weight—handle a great variety of work . . . pole-mounted, wall-mounted (ideal for damp cellars and manholes), permanently mounted—or portable. 1, 2 or 3 pen types.

In stock for immediate delivery.

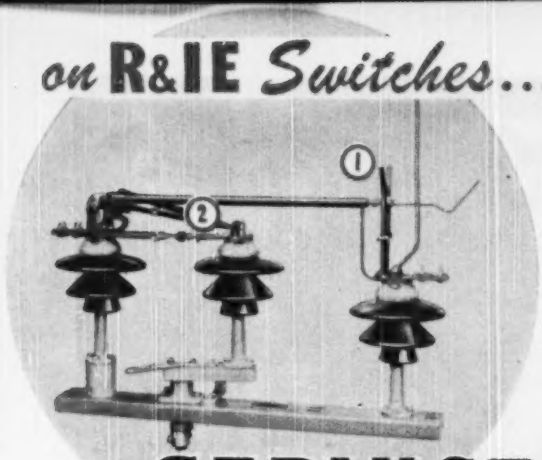
Write for Bulletin E1100. THE BRISTOL COMPANY, 116 Bristol Rd., Waterbury 20, Conn.

BRISTOL

Gives You the FACTS When and Where You Want Them

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

on R&IE Switches...



SERVICECONOMY

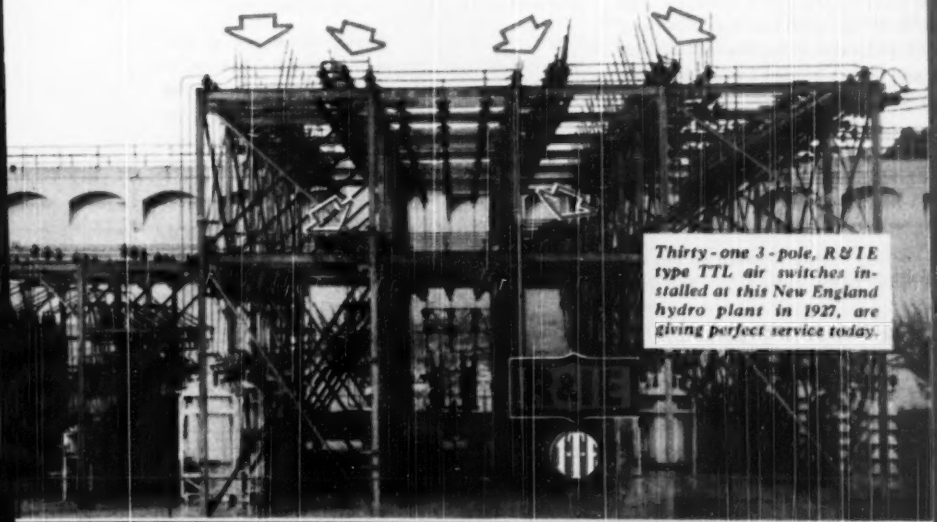
has 2 sources – **DURABILITY** *(long life)* / **DEPENDABILITY** *(low maintenance)*

The service-economy of **93** single pole R&IE Switches (see below), has been proved by twenty years continuous service.

CHECK the FACTS

1. Twenty years service from R&IE Hi-Pressure Contacts proves the soundness of this original and exclusive R&IE design.

2. Twenty years service proves the reliability of the simplified, high-leverage, operating mechanism, which, with continuous motion first releases the contact and then opens or closes the blade.



Thirty-one 3-pole, R&IE type TTL air switches installed at this New England hydro plant in 1927, are giving perfect service today.

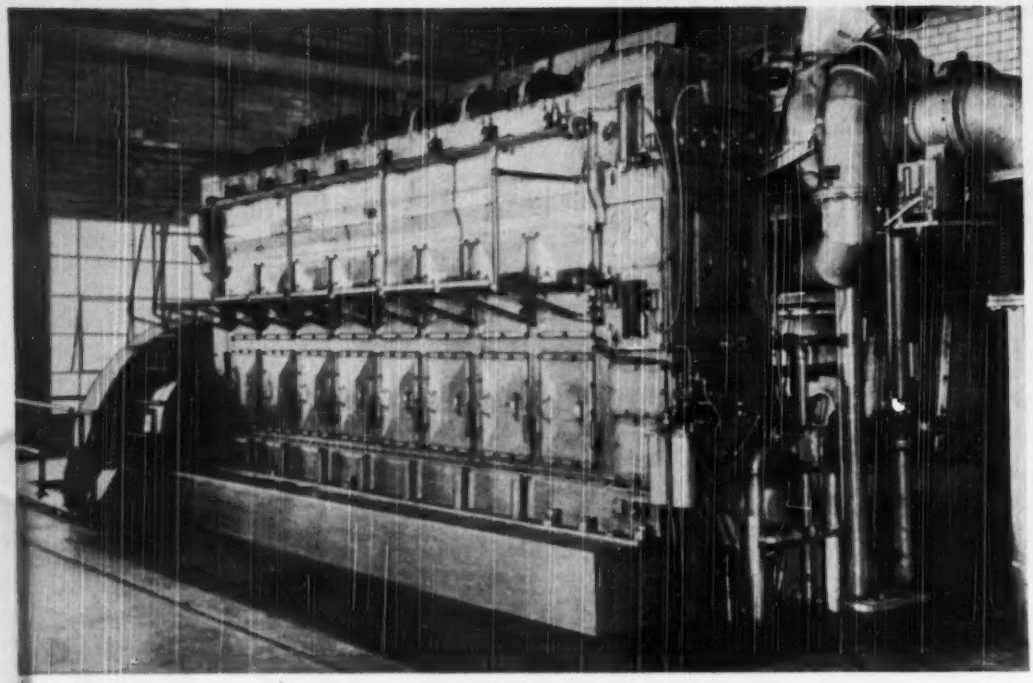
RAILWAY and INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.

AFFILIATED WITH THE I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

IN CANADA: EASTERN POWER DEVICES LIMITED, TORONTO

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SWITCHING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES



A Giant with a Midget's Appetite

An Iowa power company is taking advantage of Superior's outstanding fuel economy. This engine is a Superior model 80-Ex-8. Although it develops 1440 BHP at 360 RPM, it uses much less fuel than many other engines of similar size. In fact the engine's high KW capacity per gallon of fuel has been highly commended by the plant operators.

This economy is not unusual with Superior engines. Such features as dual intake and exhaust valves, for instance, help develop this engine's amazing power economy. These valves contribute to higher volumetric efficiency, fuel economy and greater reserve capacity.

And the supercharging feature installed on this engine results in greater power out-put from the same cylinder displacement. This additional power combined with Superior's economical operation adds up to important savings for this power company.

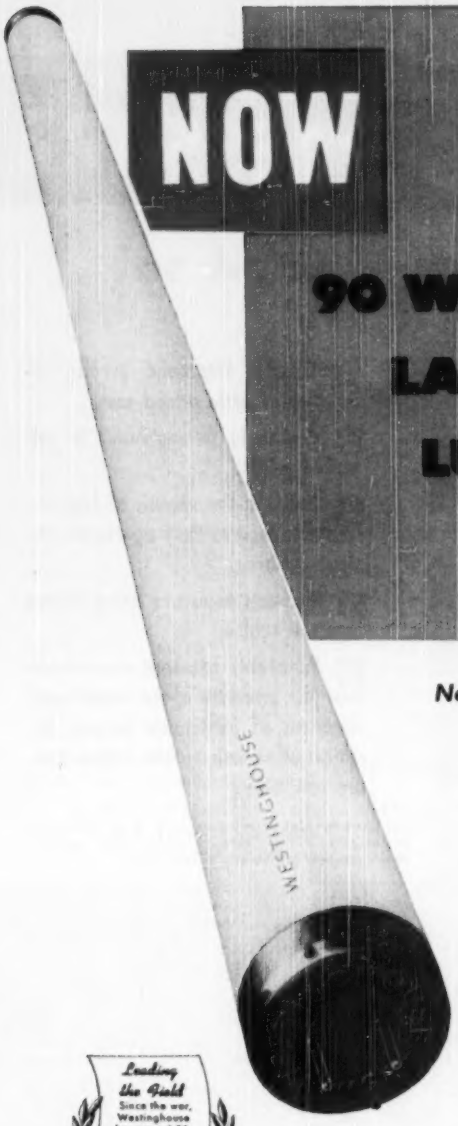
If you're looking for adequate power with exceptionally low fuel consumption check Superior. A Superior representative will be glad to call and present all the facts. Just write and tell us when you want him to call. In the meantime send for our fully illustrated booklet. *Superior Diesel For Stationary Applications.*

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

THE NATIONAL SUPPLY COMPANY

Superior **DIESELS**

Locomotive · Marine · Oil Field · Stationary



NOW

WESTINGHOUSE 90 WATT FLUORESCENT LAMP PRODUCES 54 LUMENS PER WATT

Leading the Field
Since the war, Westinghouse has scored 35 firsts in producing new and improved light sources

New Krypton-Argon Lamps Cut Fluorescent Cost

This new Westinghouse lamp, containing equal amounts of krypton and argon gases, produces 4860 lumens . . . six percent more light than the 85-watt lamp which it supersedes . . . at a total electrical increase of only three watts.

The size of the lamp remains the same . . . 5 feet long and 2⅛ inches diameter . . . and operates in either 85-watt or the old 100-watt lighting equipment. The 90-watt lamp is 17 percent more efficient than the 100-watt, all-argon lamp which the 85-watt lamp had replaced . . . and it triples the light output of a 100-watt incandescent bulb.

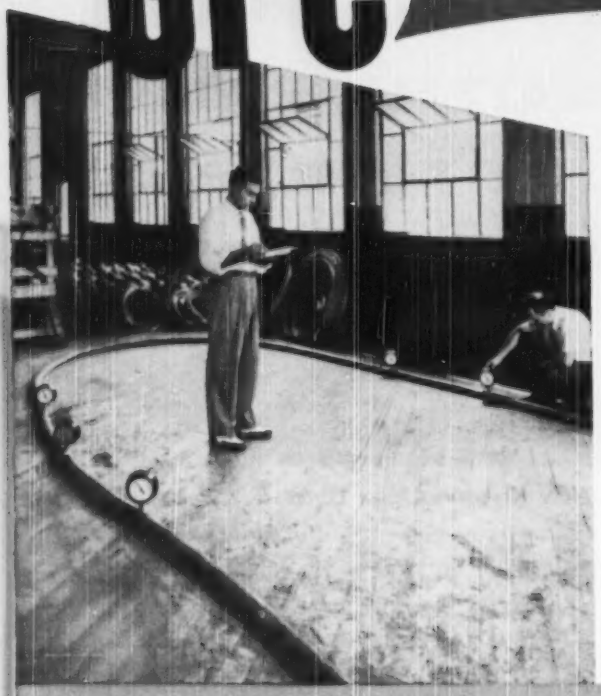
The new 90-watt lamp is available in the five standard shades of white. For more information about this new cost-cutting lamp, call your Westinghouse Lamp Distributor or write to Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey.

YOU CAN BE SURE...IF IT'S

Westinghouse

Here's why it pays to use

GPC GAS PRESSURE



1 Greatly improved service reliability at little added cost.

2 Positively avoids burst or collapsed joints.

3 Relieves the sheath of high internal pressures that aggravate fatigue failures.

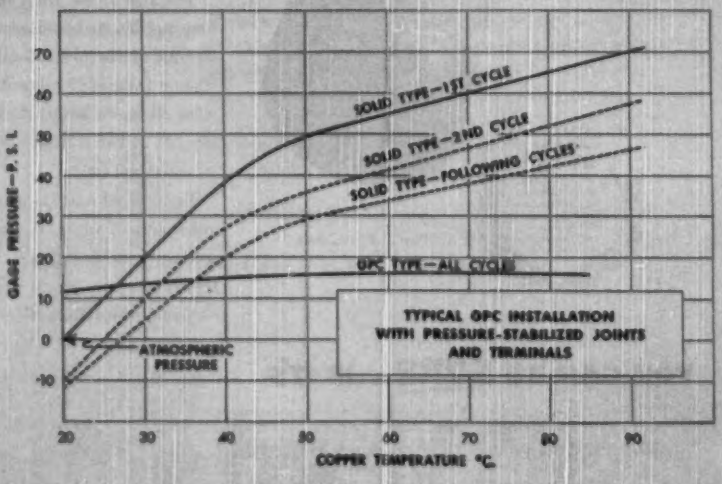
4 Prevents moisture being drawn into the cables.

5 Maintains constant supervision over the integrity of the sheath and tightness of joints and permits location of sheath breaks before failure can occur.

Increased current carrying capacity is an important advantage of GPC Cable. Made possible because sheath stresses are carefully controlled.

Comparison of internal pressures during heating

Solid type cable versus GPC Gas Pressure Compensated Cable.



COMPENSATED CABLE

for both high and low-voltage

■ Engineers are generally familiar with the troubles experienced with high voltage cables due to the internal pressures and vacuums generated by the expanding oil saturant of the cable.

Our "GPC" Gas Pressure Cable offers a complete solution to that problem.

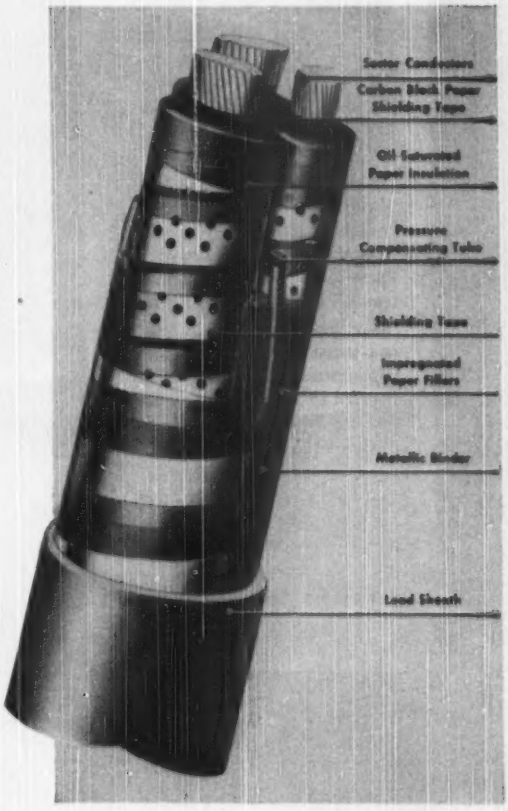
It is not generally appreciated that the cable expansion problems are not restricted to high voltage cables but are equally prevalent in all types of paper insulated cables. Failures in 600 volt paper cables are attributable to lead failures in the majority of cases.

The "GPC" Gas Pressure principle is equally applicable to low voltage multiple conductor cables. By providing perforated tubes to act as a cushion for the expanding oil, and a nonperforated tube to act as gas pressure feed for stabilizing joints, terminals and the entire cable run, the internal pressure can be controlled within the safe limits of operation of the sheath and kept above atmospheric at all times.

The result is that stretched sheath and burst or collapsed joint sleeves are avoided. Moreover, the harmful effect of longitudinal expansion at manhole bonds is minimized since one source of strain in the sheath is avoided.

In case the sheath is damaged by mechanical injury, corrosion or repeated bending, the pressure of the gas will prevent moisture from being drawn into the cable, and the lowering of gas pressure on the system will give immediate warning that a damaged sheath exists. It is not difficult to find the location of the leak either by observation, gas pressure drop or gas flow devices installed on the joints.

Type GPC Cable and the necessary accessories add a very small percentage to the cost of the cable installation. GPC Cable is recommended for all installations of multiple conductor cables, especially those subject to wide fluctuation in temperature, such as aerial cables or power feeders carrying heavy loads. Write for complete engineering information.

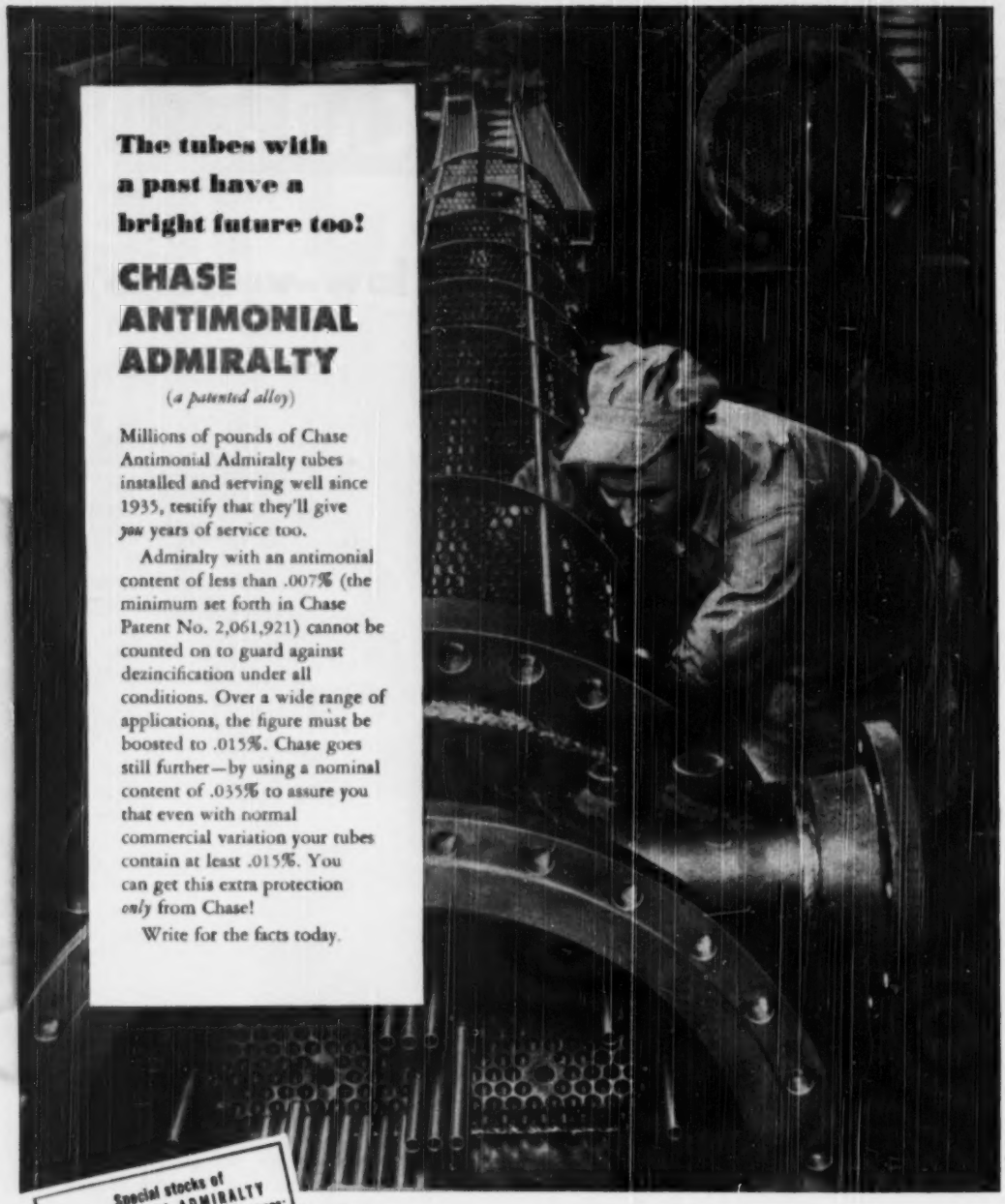


AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMERICAN PAPER INSULATED CABLES

UNITED STATES STEEL



The tubes with a past have a bright future too!

CHASE ANTIMONIAL ADMIRALTY

(a patented alloy)

Millions of pounds of Chase Antimonial Admiralty tubes installed and serving well since 1935, testify that they'll give *you* years of service too.

Admiralty with an antimonial content of less than .007% (the minimum set forth in Chase Patent No. 2,061,921) cannot be counted on to guard against dezincification under all conditions. Over a wide range of applications, the figure must be boosted to .015%. Chase goes still further—by using a nominal content of .035% to assure you that even with normal commercial variation your tubes contain at least .015%. You can get this extra protection *only* from Chase!

Write for the facts today.

Special stocks of ANTIMONIAL ADMIRALTY Condenser Tubes in Chase Warehouses: NEW YORK, BALTIMORE, NEW ORLEANS LOS ANGELES, SAN FRANCISCO

also carried by—
Vinson Supply Co., Tulsa
Standard Brass & Mfg. Co., Houston

Chase

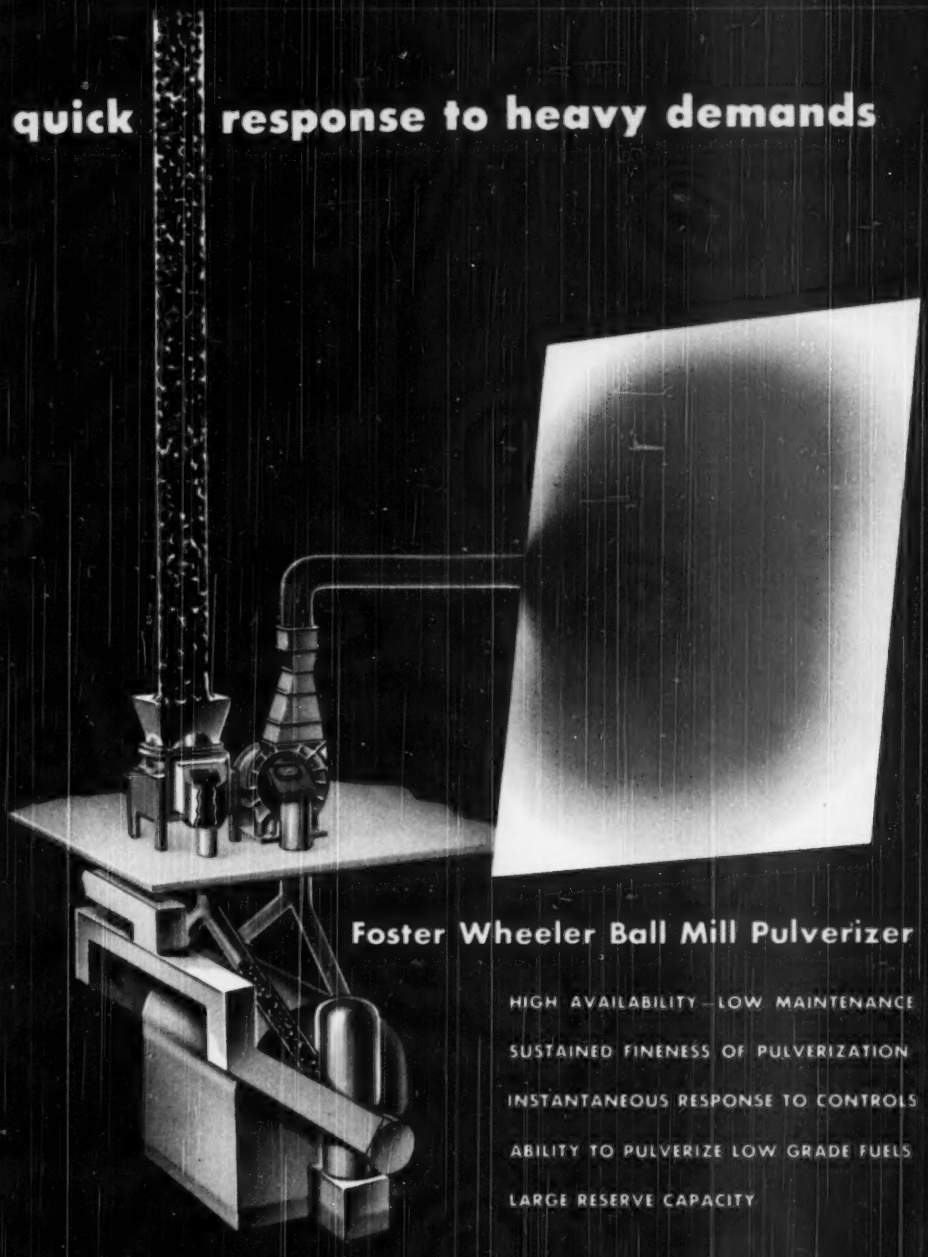
the Nation's Headquarters for
BRASS & COPPER

WATERBURY 20 CONNECTICUT — SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK . . . handiest way to buy brass

ALBANY ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DALLAS DENVER DETROIT HOUSTON INDIANAPOLIS KANSAS CITY MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER ST LOUIS SAN FRANCISCO SEATTLE WATERBURY

quick response to heavy demands



Foster Wheeler Ball Mill Pulverizer

HIGH AVAILABILITY—LOW MAINTENANCE

SUSTAINED FINENESS OF PULVERIZATION

INSTANTANEOUS RESPONSE TO CONTROLS

ABILITY TO PULVERIZE LOW GRADE FUELS

LARGE RESERVE CAPACITY

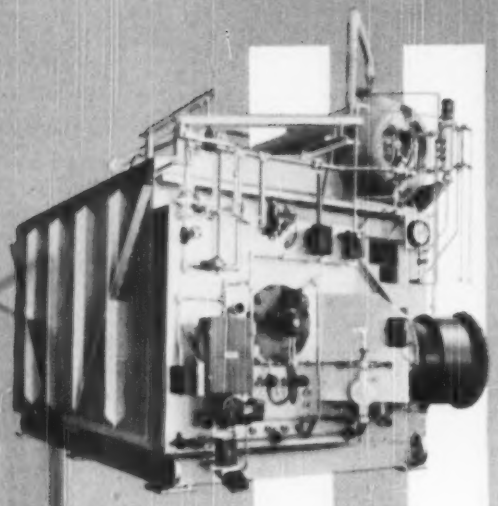
The basic qualities of dependability, responsiveness and capacity for hard work . . . as symbolized by the prize workhorse . . . are also desirable in modern machinery. But it's the added element — *skilled engineering* — that removes us so distantly from the horse age and makes it possible to build machinery like the Foster Wheeler Ball Mill Pulverizer which pulverizes as much as 30 to 40 tons of coal per hour with instantaneous response to load demands.

For [illegible] write to

FOSTER WHEELER CORPORATION • 165 BROADWAY, NEW YORK 6, N. Y.

a small unit with a great background

FOSTER WHEELER PACKAGE STEAM GENERATORS



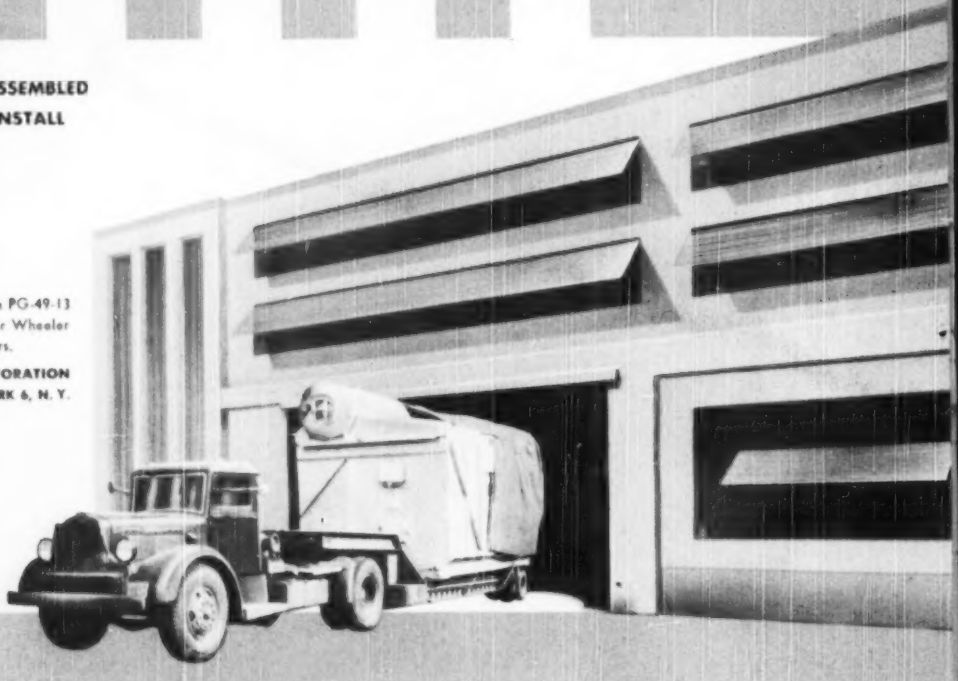
water-tube units embodying the best features of central station and industrial steam plants

The average boiler horsepower per unit of 15,000 installations which were surveyed recently lies between 150 to 175 hp. These units were found to be operating at extremely low efficiencies with poorly coordinated equipment. There was also evidence that erection had been done by unskilled or semiskilled labor.

Could one of these installations be yours?

Provide for your present and future steam plant requirements by installing a scientifically integrated Foster Wheeler Package Steam Generator which *insures continuous steam output under widely fluctuating load demands at low cost and with a minimum of maintenance.* Exclusive Foster Wheeler features affecting casing, combustion controls, insulation and general structure are incorporated in this unique package unit.

FACTORY ASSEMBLED
READY TO INSTALL



Write for a copy of Bulletin PG-49-13 covering all types of Foster Wheeler Package Steam Generators.

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

Bituminous is basic—the mainspring of America's might. Far-thinking executives—those who study existing facts, consider long-term possibilities, and prepare for emergencies—know this. So the vital decision so often made is, "build for bituminous."

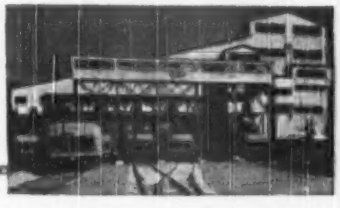
Amid the uncertainties of the future is this fact: In the area served by the Baltimore & Ohio, lie vast, untapped reserves of excellent bituminous coals. They're in wide variety, and highly mechanized mines can produce them properly prepared for every requirement of modern industry.

Year after year, tireless research has made bituminous increasingly dynamic. Its further possibilities are tremendous. B&O, too, is constantly seeking better ways of serving the bituminous industry and its customers. In recent years, millions of dollars have been spent to improve B&O facilities for bituminous distribution.

Here's real help for bituminous in guaranteeing the greatness of American industry for years to come. *Ask our man!*

BITUMINOUS COALS FOR EVERY PURPOSE

—from modern mines like this—



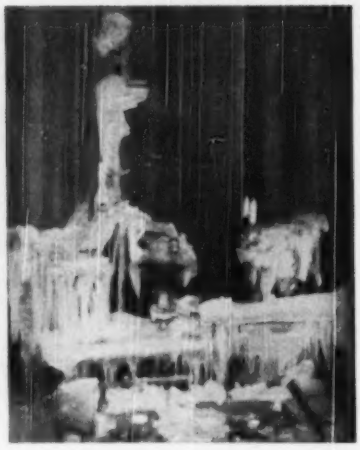
BALTIMORE & OHIO RAILROAD

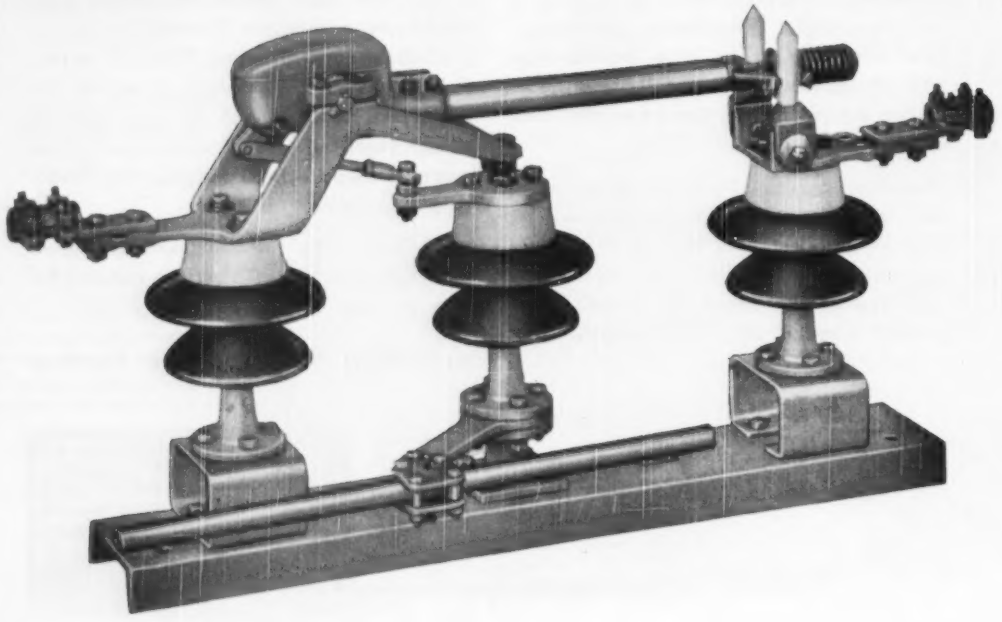
Constantly *doing things*—better!

Cole Electric Co.

8439 Steller Drive TExas 0-4701 Culver City, Calif.

Tests made in our laboratory under severe icing conditions show the switch illustrated below, closed (left) and after opening (right). Ice was over 1" thick. Only 450 inch pounds were required to open switch.





Air Break Disconnecting Switch—15,000 Volts, 600 Amperes, Type 0-2
Vertical Break, Three Pole, Single Throw, Group Operated
SILVER TO SILVER CONTACTS

Corning FOTA-LITE
combines the advantages of louvers with flat glass

In many lighting installations, high level illumination and uniform brightness control are desirable, but difficult to achieve due to space limitations, cleaning difficulties and problems of decor. For lighting the Barton's Bonbonniere, Corning Fota-Lite afforded the ideal solution. With four-foot panels of Fota-Lite each with 12-40 watt 3500° lamps, excellent foot candle and brightness values are realized. Highlighting is provided by PYREX brand Lenslites illuminated by 150 watt lamps. Every light fixture is recessed. Cleaning is greatly simplified.

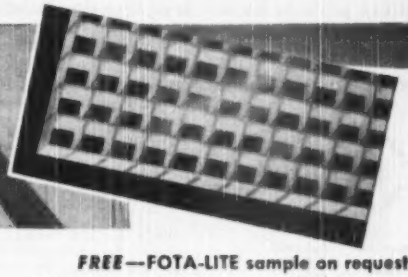
FOTA-LITE is a revolutionary lighting medium. Without bulky, hard-to-clean materials, light distribution is controlled by louvers photographically sealed in a thin panel of glass. Fixtures can be made shallow and dust-tight. Initial efficiency remains unimpaired.

The cell size of Fota-Lite louvers is many times smaller than in conventional louvering materials. This gives it the appearance of an opal diffusing glass. However, vertical light is unrestricted by the clear sections and surface brightness is reduced by the 45° cut-off of the diffusing louvers.

The versatility of Fota-Lite gives it an unusually wide range of application. It will pay you to investigate. Send for a sample demonstration card today.

◁ *Barton's Bonbonniere, New York City*

Designer: Hans Weiss and William Basser, New York City
Fixture Manufacturer: Neo-Ray Products, Inc., New York City
Electrical Contractor: Bigman Brothers, Brooklyn, N. Y.
Glass: Corning Fota-Lite (note photo below) and Pyrex brand Lenslites



CORNING GLASS WORKS
CORNING, NEW YORK
Corning means research in Glass

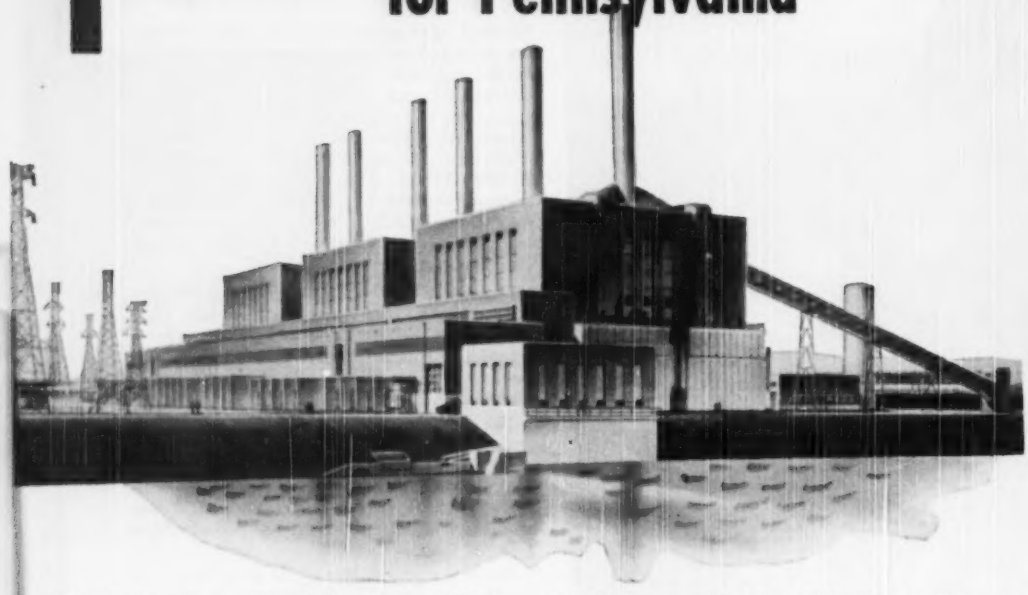
FOR EFFICIENT, ATTRACTIVE LIGHTING...
CORNING ALBA-LITE for diffusion of fluorescent light ... CORNING FOTA-LITE for high level illumination ... CORNING brand LENS PANELS and PYREX brand LENSLITES for prismatic light control

***FREE*—FOTA-LITE sample on request:**

CORNING GLASS WORKS, Dept. EW-6, Corning, N. Y.
Please send me your FOTA-LITE demonstration card showing how FOTA-LITE diffuses and cuts off light at 45°

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

power
for Pennsylvania



The Sunbury Steam Electric Station now being constructed by EBASCO for Pennsylvania Power & Light Company, with an ultimate generating capacity of 550,000 KW, will be the world's largest pulverized anthracite-burning power plant.

It's another striking example of the large and complex utility projects EBASCO is equipped to handle, from planning to "in-service" operation.

EBASCO's team of specialists has been meeting the technical needs of public utilities for over 40 years. In the U. S. alone, EBASCO has designed and constructed steam and diesel electric stations with a generating capacity totalling more than 5,000,000 KW; in foreign countries, plants with over 500,000 KW. In addition to its vast experience with traditional fully-housed plants, EBASCO has pioneered in semi-outdoor and outdoor installations.

Whatever your problem—whether it's constructing a new power plant or improving present facilities—EBASCO can provide the help you need, when and where you need it.

ENGINEERS · CONSTRUCTORS
EBASCO
BUSINESS CONSULTANTS

Appraisal	Insurance & Pensions
Budget	Office Modernization
Business Studies	Purchasing
Consulting Engineering	Rates & Pricing
Design & Construction	Research
Financial	Sales & Marketing
Industrial Relations	Systems & Methods
Inspection & Expediting	Taxes
	Traffic

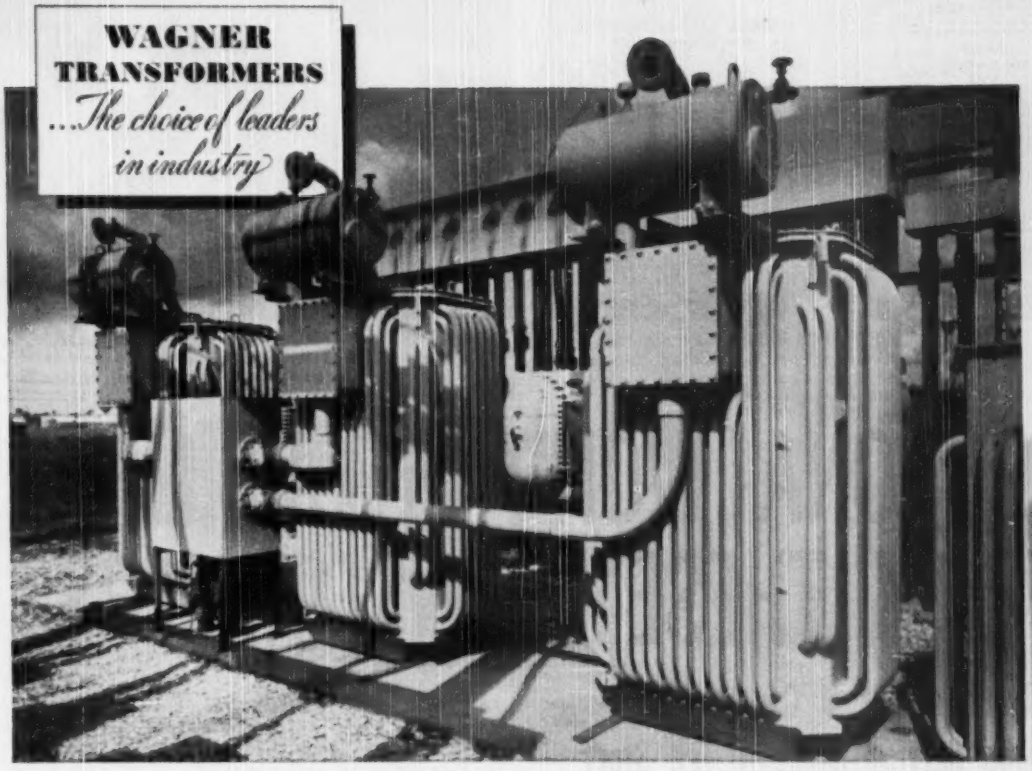
Write for the booklet *"The Inside Story of Outside Help"* describing the many EBASCO services available to you. Ebasco Services Incorporated, Dept. K, Two Rector Street, New York 6, N. Y.

EBASCO SERVICES

INCORPORATED

NEW YORK · CHICAGO · WASHINGTON, D. C.

Ebasco Teamwork gets things done anywhere in the world



Bank of 667 kva, 1 phase, 60 cycle, 2400 to 480 volt Transformers

Wagner Transformers power the production of Rohm & Haas "Chemicals for Industry"

Production of "Chemicals for Industry" by the Rohm and Haas Company, makers of famed Plexiglas, is not a simple one-plant operation. The products of one of their plants may have no resemblance to the commercial products into which they are integrated at another plant. The natural raw material found in Texas, for instance—the processed chemicals manufactured there—and Plexiglas, an end product manufactured in another plant—are all part of a great modern production chain.

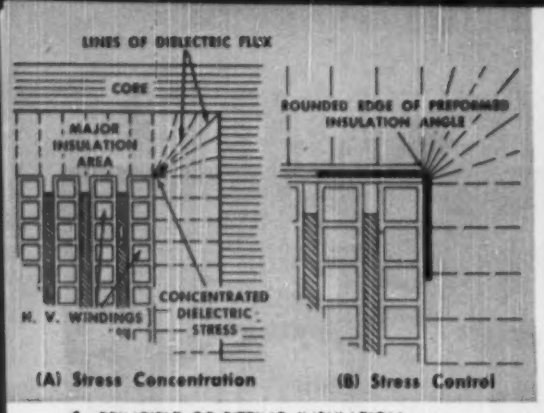
Power for production—with Rohm and Haas as with any modern industry—is provided by electricity. The manufacture of chemicals in the Rohm and Haas plant in Deer Park, Texas, is powered by Wagner Transformers and Wagner Motors. Wagner transformers in the main substation take energy at 69,000 volts and feed it to the low voltage substation at 2400 volts. The low voltage substation of Wagner transformers (illustrated above) in turn furnishes 480 volts to motors and to small air-cooled Wagner transformers which furnish 120 volts for lights and other single phase loads.

Thirty-one branch offices, located in principal cities, are ready to help you whenever you have a transformer problem. Users of Wagner Transformers also benefit by nationwide service facilities. Write for Bulletin TU-180 and TU-181 for full information on Wagner Power and Distribution Transformers.

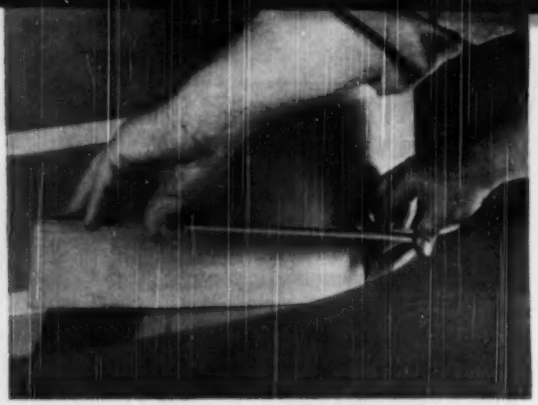
WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES



1 PRINCIPLE OF FITTING INSULATION right up next to areas of high dielectric stress, then reducing stress per unit area with rounded surfaces, is one of the methods used by Allis-Chalmers engineers to cut corona discharge.



2 PREFORMED INSULATION angles are fitted snugly against coils. This eliminates voids in critical regions and reduces concentration of dielectric forces to prevent corona formation. Die-forming of these angles on electronic heater insures exact fit, eliminates air pockets in insulation.

CORONA WON'T STEAL LIFE FROM THESE TRANSFORMERS

Transformers at Central Illinois Public Service Company Tell Story of Surge-Protected Insulation

WHAT MAKES a transformer grow old? One of the chief causes is internal corona discharge — an invisible hazard that can only be detected by accurate readings of cathode ray oscillograms. The presence of corona during operating surges *scores* insulation and causes gradual weakening of transformer impulse strength.

The complete solution to this problem is announced in the Allis-Chalmers corona-free design. By a combination of improvements, *all measurable effects of corona have been eliminated* — including effects that were not even detectable until recent years!

Insulation was moved right next to high voltage conductors, replacing "free space" with corona-resisting material in critical areas. Vulnerable parts of terminal boards were rounded and shielded to eliminate sharp contours. Dielectric fields were redirected, spacers redesigned and new materials used to completely "knock out" injurious corona.

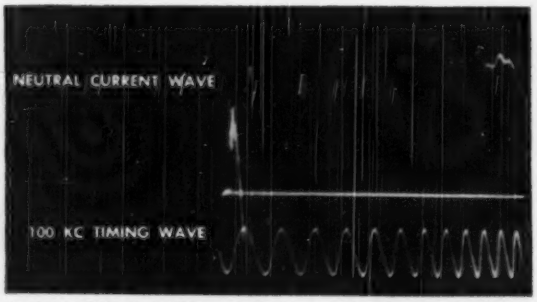
Protected by this design, Allis-Chalmers power transformers will retain their full impulse strength after repeated surges or switching.

To the nation's electric power producers — like Central Illinois Public Service Company, purchaser of the transformer pictured here — this design will mean greater operating confidence, more reliable service, and full return on invested capital.

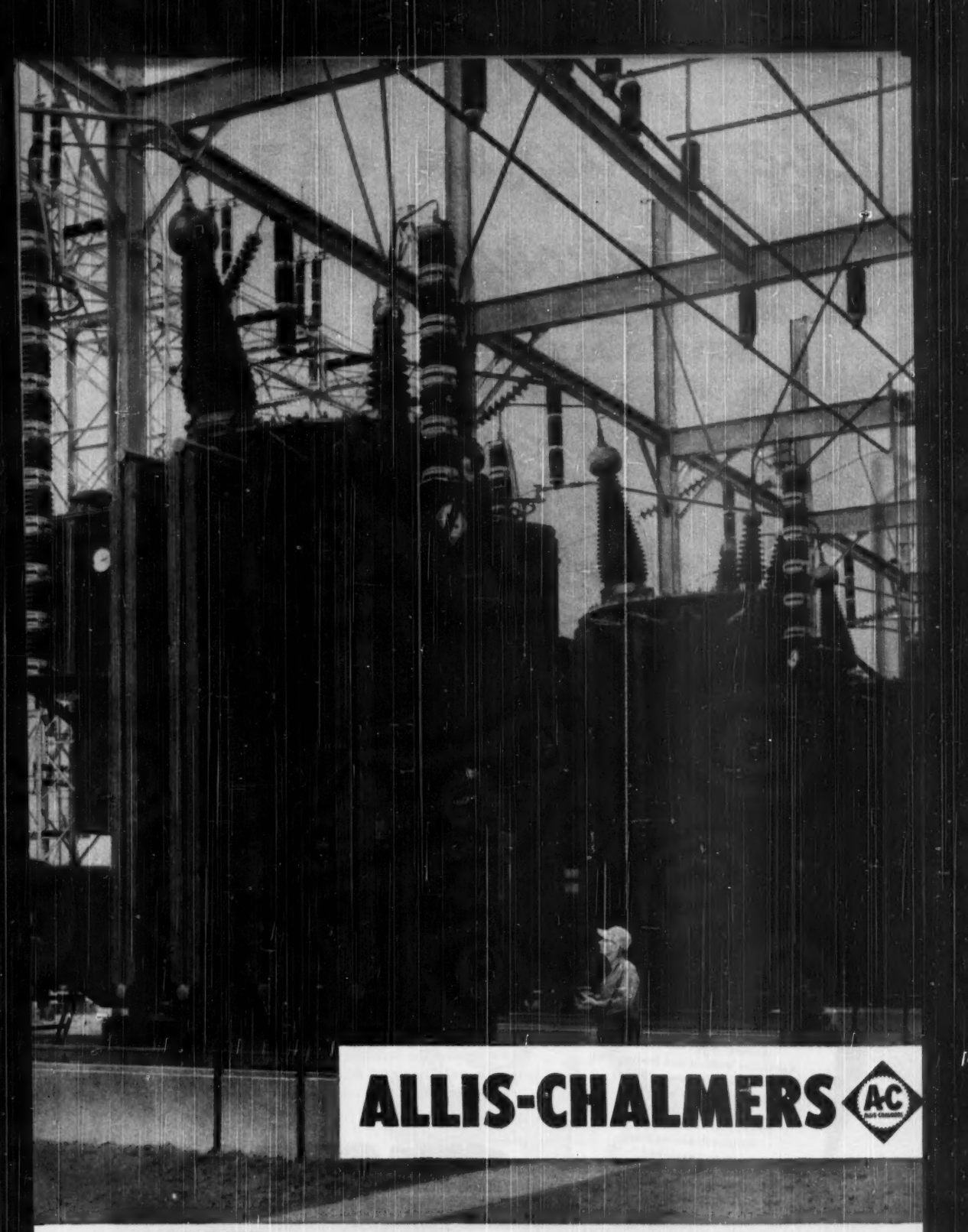
A-3092

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

3 ROUNDED SHIELDS distribute electrostatic flux around tap changer contacts to stop corona. Spacers between contacts and panel control dielectric stress between contacts, permit more compact assembly.



4 EVEN THE SMALLEST corona effect—smaller than that which could harm transformers in years of operation — can be detected with new oscillographic test techniques. Above is sample oscillogram taken during a transformer impulse test. Analysis of many such curves, taken under varying conditions, showed "no detectable corona discharge whatsoever" at over five times normal operating voltage.



ALLIS-CHALMERS

5 **TO FURTHER PROTECT** against surges, high and low voltage lightning arresters are mounted directly on transformers, close to the bushings. *Oil-Sealed* Inert Gas expansion tanks are mounted on side of transformers, near the ground, to increase overhead line clearances. Installed bank is rated 35,000/45,000 kva, 138 to 69 kv; equipped with ± 10% load ratio control

Everything IN CARBON *but Diamonds!*

PLUS GRAPHITE, MOLDED METALS SINTERED ALNICO II

HUNDREDS of STANDARD ITEMS . . . *thousands of "Specials"*

Write for details on any type

Anodes • Battery Carbons
Bearing Materials
Brazing Furnace Boats
Brushes of all types for rotating electrical equipment
Carbon and Graphite Contacts
Chemical Carbons • Clutch Rings
Dash Pot Plungers
Electric Furnace Heating Elements
Electrolytic Anodes • Friction Segments
Glass Molds • Ground Rods (carbon)
Mercury Arc Rectifier Anodes
Metal-Graphite Contacts
Power Tube Anodes
Rail Bonding Molds
Rare Metal Contacts
Resistance Welding and Brazing Tips
Seal Rings (for gas or liquid)
Special Molds and Dies
Spectrographite No. 1
Trolley and Pantograph Shoes
Voltage Regulator Discs
Water Heater and Pasteurization Electrodes
Welding Carbons
Welding Plates and Paste

. . a dependable source of supply

The unique electrical, mechanical, physical and chemical properties of Stackpole carbon, graphite and carbon-graphite products solve countless problems of friction, temperature, arcing, corrosion, shaft sealing, voltage regulating and others. So broad is the line of standard Stackpole products, so extensive the facilities for "specials" that it is practical to list only a few of them here. Let Stackpole engineers recommend and quote on your next requirements.

STACKPOLE

STACKPOLE CARBON CO., ST MARYS, PA.

WICKWIRE ROPE

A PRODUCT OF CF&I

Ask any user . . . you'll find them everywhere

In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISCOLAY® Preformed. It lasts longer—is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant—Palmer, Mass.

IN THE EAST—Wickwire Spencer Steel Division, CF&I, 500 Fifth Ave., New York 18, N. Y.
IN THE SOUTH—The Colorado Fuel and Iron Corp., Continental Oil Bldg., Denver, Colo.
ON THE WEST COAST—The California Wire Cloth Corp., 5360—65th Ave., Oakland 6, Cal.

A. E. Backman

G.E.'s 9574 all-purpose insulating varnish provides

BETTER BONDING
BETTER PENETRATION
NO SLUDGING

Mr. Guy W. Probst

That's what Guy W. Probst, owner of the Lockhaven Electric Repair Co., Lockhaven, Pa., says about General Electric's 9574. Here is his statement:

"G-E all-purpose insulating varnish 9574 gives you a cover coat you can see and that fills up between the Formex wires. I've had very good success with it on armatures up to 2000 RPM. On formed coils I can bake before forming and the turns don't come apart when you pull the coil. I've had no trouble with sludging, and all my work is hot dipped. I find that I only use about half as much 1201 Glyptal as a cover coat on 9574 as I had to use over the varnish I had been using, and I get higher gloss and better bonding when 1201 is used over 9574."

**G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G.E.'s complete line of electrical insulating materials, including adhesives, wedges, cements, compounds, cords and twines, sleeving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, varnishes.*

EASY TO USE

BAKES AT LOWER TEMPERATURES than is possible with most other synthetic varnishes.

PENETRATES EASILY into the deepest coils.

NO SPECIAL THINNER required (just petroleum spirits).

STABLE—will not tend to harden in the tank.

SEND FOR BULLETIN!

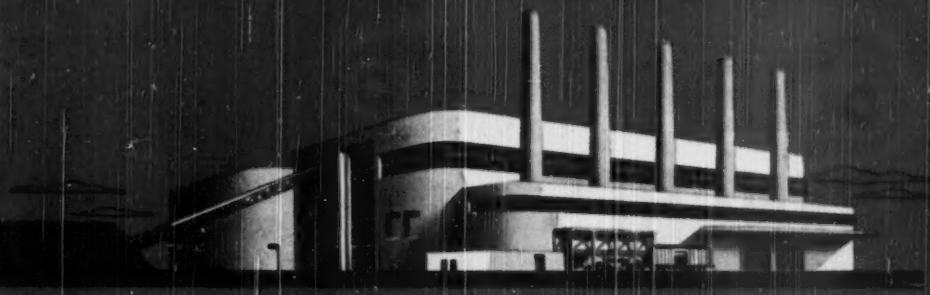
If you haven't yet tried G-E 9574, get in touch with your local G-E Distributor, or write for our new bulletin to Section K-2, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in

GENERAL ELECTRIC

CD50-K2

Unequalled Piping Experience



PIPING FOR MORE THAN

3,400,000 kw

of Central Station Capacity

has been fabricated and erected by

MIDWEST

Since 1945

*Including Projects Now Under Construction or on Contract

MIDWEST PIPING SERVICE IS NATION-WIDE

PIPING FABRICATORS AND CONTRACTORS

MIDWEST PIPING & SUPPLY COMPANY, INC.

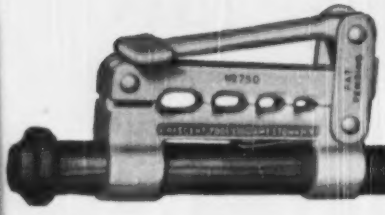
Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices: New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 54—320 Anderson St. • Houston 2—1210 Capitol Ave.
Tulsa 3—820 Mayo Bldg. • Boston 17—470 Pratt St.

CRESCENT SLEEVE WRENCHES

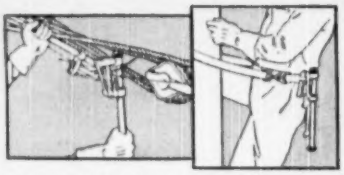
PRODUCE BETTER JOINTS FASTER... SAFER



● Crescent No. 750 Sleeve Wrenches not only produce a far better sleeve joint but definitely reduce working hazards. Oil-impregnated hickory handles assure almost perfect insulation, prevent flash if contacted with hot wire. Design of the openings is such that maximum strength of the joint is assured. For use with single or double tube sleeves . . . available in over 375 different opening combinations. Order in pairs from your supply house, or write us for complete information.

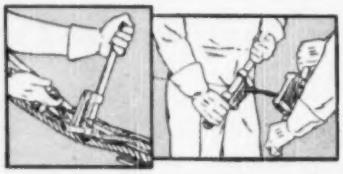
CRESCENT TOOL CO., JAMESTOWN, N. Y.

INSURE 90-98% PERFECT JOINTS



SLIDING HANDLE CLEARS TACKLE. NO UNCLAMPING

HANGS SECURELY IN BELT



READILY RELEASED WITH ONE HAND

SIX FULL TURNS WITHOUT DAMAGE TO SLEEVE

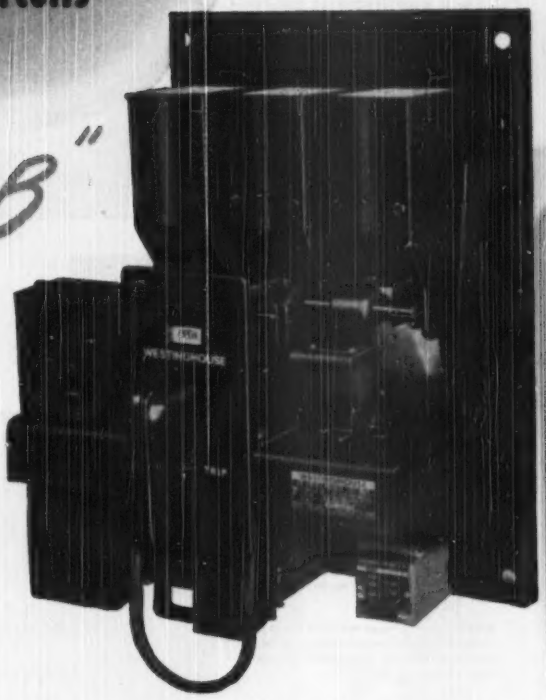
"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by Crescent Tool Company, Jamestown, N.Y.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Here's Better Protection for Low-Voltage Circuits

The NEW "DB"



It's a completely new breaker, designed for severe, continuous duty as the protective link between the power source and your productive equipment. Its many features are all planned to provide minimum maintenance throughout a long operating life:

New Overcurrent Tripping Device—Hermetically-sealed overcurrent trip provides time-delay on overloads, plus instantaneous tripping on fault currents. Short time-delay characteristics on fault currents for selective tripping when specified.

All-Metal Mounting Base—Provides a strong, rigid foundation for all parts.

Unit Construction—All attachments and parts easily removed as a unit.

"De-ion" Arc Interruption—For quick arc extinction . . . longer contact life.

Easier Installation—Smaller size . . . easier to work around. Free standing when unmounted.

Long Operating Life—Moving and wearing parts of hardened stainless steel. J-60719

Here's COMPLETE Information

Get answers to your questions, plus complete, detailed information from the new DB Breaker Book. Ask your Westinghouse representative or distributor for your copy of B-4067, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

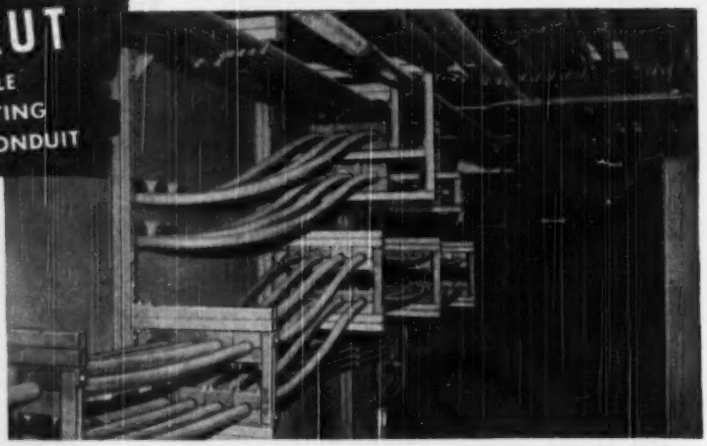
Westinghouse

"DE-ION" CIRCUIT BREAKERS

New Type DB

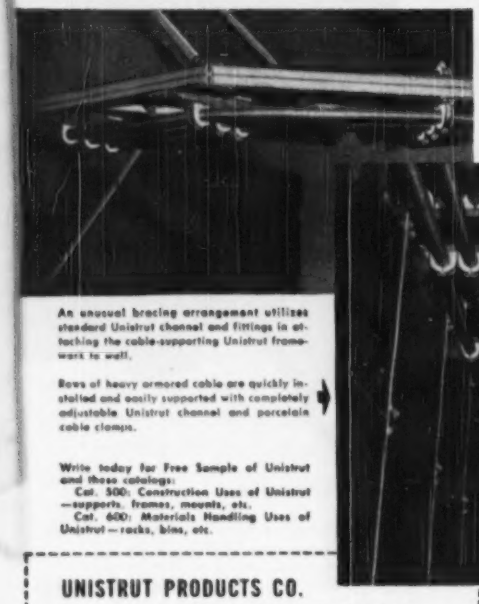
IOWA ELECTRIC LIGHT and POWER COMPANY

FINDS UNISTRUT THE MOST FLEXIBLE MEANS OF SUPPORTING HEAVY CABLE AND CONDUIT



Like a giant Erector set, completely adjustable Unistrut simplifies the most difficult problems of supporting heavy cable and conduit used in distribution systems—permits fast, on-the-job framing assembly where all adjustments are easily made by just loosening a bolt, and supporting members added as work progresses. No drilling, no welding, no special tools or equipment—saves time, cuts costs. A trial of Unistrut on your next job will show you how much quicker, better and more economically the work can be done.

Notice Unistrut's trim steel framework. Note too the Unistrut porcelain and maple clamps that hold the heavy cable and conduit firmly in place.



An unusual bracing arrangement utilizes standard Unistrut channel and fittings in attaching the cable-supporting Unistrut framework to wall.

Runs of heavy armored cable are quickly installed and easily supported with completely adjustable Unistrut channel and porcelain cable clamps.

Write today for Free Sample of Unistrut and these catalogs:
Cat. 500: Construction Uses of Unistrut—supports, frames, mounts, etc.
Cat. 600: Materials Handling Uses of Unistrut—racks, bins, etc.

THIS IS UNISTRUT!

Unistrut is metal channel with a continuous slot. You simply insert the Unistrut spring nut into the channel at approximate point where attachment of another framing member is desired, slide to exact location and bolt to Unistrut fitting. Unistrut includes concrete inserts, pipe and cable clamps, roller pipe supports, brackets, and many other standard parts which in combination provide the world's most flexible system of support or suspension.

Unistrut is trim framework—provides great strength without bulk. It's easy to work with, lasts indefinitely, and the finished structure assures neat and orderly appearance. With it you can build practically everything—all types of framing, mounts, shelving, racks, tables and benches, cable, conduit, pipe and tubing hangers and supports, fluorescent fixture supports and many other structures with only a hacksaw and a wrench.

THE 3 QUICK UNISTRUT STEPS

1. Insert nut into channel
2. Locate fitting and nut
3. A turn of the wrench—it's done

Prompt delivery from Warehouse Stocks in Principal Cities. Consult your Classified Directory.

UNISTRUT PRODUCTS CO.
1013 W. Washington Blvd., Chicago 7, Ill., Dept. W-6

Please send free sample of Unistrut and catalogs checked below without obligation.

Catalog 500 ☐ Catalog 600 ☐

Name_____

Company_____

Address_____

City_____ Zone____ State_____

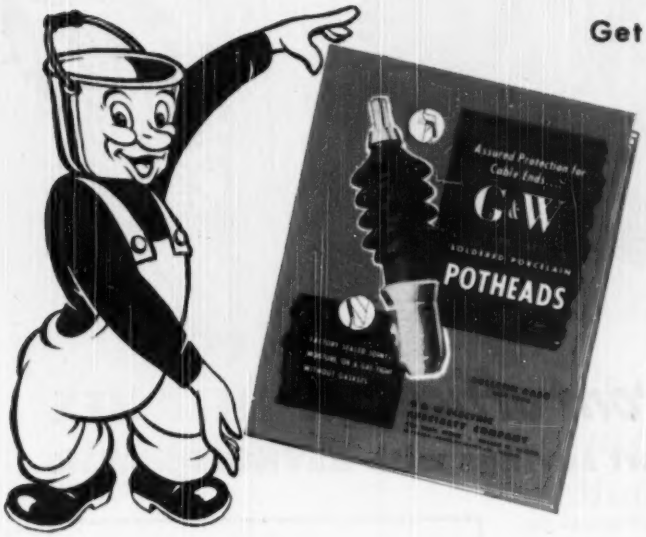
*U. S. Patent Numbers
2327587 2380379
2363382 2345650
2329815 2405631
Other patents pending

UNISTRUT
The World's Most Flexible All-Purpose Metal Framing

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd.
Chicago 7, Illinois

FOR *PERMANENT* CABLE END PROTECTION

Use G & W TYPE *"ST-SODERTITE"* POTHEADS



Get Complete Information

IN NEW G & W

BULLETIN AA50

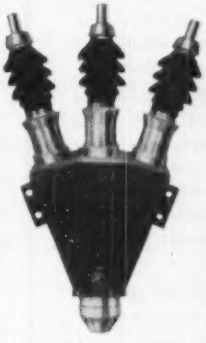
- **5 KV. TO 69 KV. SINGLE AND MULTIPLE CONDUCTOR UNITS.**
- **COMPLETE ELECTRICAL AND MECHANICAL SPECIFICATIONS FOR ALL SIZES AND RATINGS.**
- **STRESS RELIEF CONE INFORMATION.**
- **DIRECTIONS FOR INSTALLATION.**
- **OUTLINE OF G & W PROCESS FOR SOLDERING PORCELAIN TO METAL.**

G & W Type "ST-SODERTITE" potheads have been used successfully in numerous installations for more than 10 years.

Each "SODERTITE" pothead is permanently sealed at the factory without gaskets by an exclusive G & W developed process for soldering metal parts directly to the porcelain body. Non-porous spun copper is used for the hood and wiping sleeve to insure complete protection for internal connections.

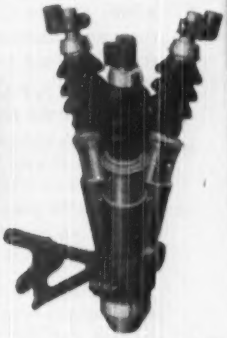
Standard units of "SODERTITE" potheads are made in numerous sizes, ratings and shapes. Special units are made to meet any unique individual requirements.

Send for your copy of New Bulletin AA50—and write to G & W or your G & W engineering representative for any further information on Type "ST-SODERTITE" potheads.



Type "ST", Shape "B", 7.5 Kv., 3 cdr. "SODERTITE" pothead has butt welded mounting lugs and non-magnetic stainless steel top plates on body.

34.5 Kv. single conductor, Type "ST-SODERTITE" pothead with wall mounting bracket and aerial lug for clamping a range of conductor sizes.



This 5 Kv., 3 cdr. "SODERTITE" pothead with cast bronze body and separate mounting bracket is an example of the special shapes made for specific requirements.

Send for your copy today!

G&W

ELECTRIC SPECIALTY COMPANY

G & W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois, U.S.A.

Gentlemen: Please send me my copy of G & W Bulletin AA50 — Type "ST-SODERTITE" Potheads.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

Front office AND FIELD MEN

Both report savings with REYNOLDS ACSR

FRONT OFFICE can count their savings the moment they sign an order for Reynolds ACSR. Its first cost is considerably less than copper and aluminum's light weight adds further savings through lower transportation costs.

But that's just the beginning! When Reynolds ACSR hits the field there's more good news. Aluminum's light weight makes for easier, faster stringing. Higher strength of ACSR permits a longer distance between poles—eliminating up to 4 poles per mile. Or, because the sag of ACSR is less than that for copper, shorter poles or supporting towers can be used.

Reynolds cable facilities are geared to meet every delivery requirement. For prices and product data, call the Reynolds office listed under "Aluminum" in your classified telephone directory.

ACSR MANUAL FOR ENGINEERS

Contains helpful information, complete charts and tables. Free when requested on business letterhead—write to Reynolds Metals Company, Louisville 1, Ky.

PREFORMED ALUMINUM ARMOR ROD

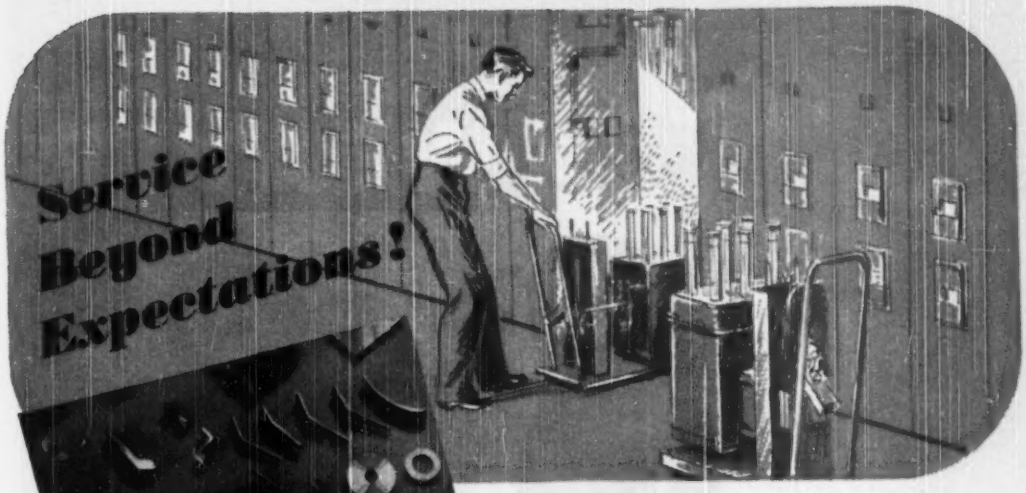
Preformed aluminum armor rods are recommended for use with Reynolds ACSR. They protect conductor against vibration, chafing, arcover, pitting and corrosion . . . maintain equal sags. There are no magnetic losses. Especially on the smaller sizes, preformed aluminum rods have proved easier and more economical to install . . . eliminate the need for clips, clamps and special tools.

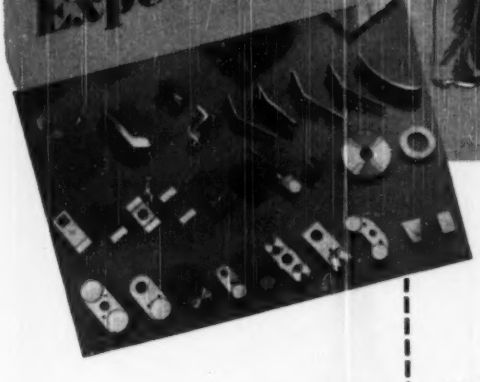
Through research, Reynolds has determined the most suitable, strong aluminum alloy for this service. For complete information, write to Reynolds Metals Company, Louisville 1, Kentucky.

REYNOLDS METALS

REYNOLDS *Lifetime* ALUMINUM

CONSIDER ALUMINUM • CONSULT REYNOLDS • THE COMPLETE ALUMINUM SERVICE





New Production Methods Reduce Contact Costs For Mallory Customers!

Mallory never ceases the search for new techniques in contact production which can help customers trim costs.

Typical is the case of a manufacturer of industrial type oil-immersed circuit breakers, using Mallory Elkonite contacts. Mallory recently installed new equipment which offered great production economies. This advanced Mallory technique saved the customer more than $4,000 in his next production run.

That's service beyond expectations!

Mallory contact know-how is at your disposal. What Mallory has done for others, can be done for you!

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Elkonite* Contacts

Elkonite is the trade name for a series of contact materials developed by Mallory and manufactured from metal powders. They are best known for their hardness, resistance to mechanical wear and impact, resistance to erosion by arcing, and resistance to sticking.

Elkonite contacts are made by the only method which permits the combining of the desirable features of basic metals which cannot be alloyed. By this means, the high melting points of tungsten, molybdenum, or their carbides, can be combined with the current-carrying ability of silver and copper.

Electrical Contacts and Contact Assemblies

*Reg. U. S. Pat. Off.

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Contacts
Controls	Resistors
Rectifiers	Vibrators
Special Switches	Power Supplies

Resistance Welding Materials

MAKE A

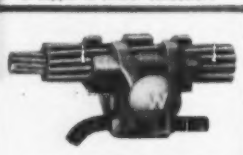
Good Connection

WITH **WEAVER**

1-WS
Copper to Copper
(Also available for general purpose use —1-WS-C)

WSB-C
Cadmium Plated
General Purpose
(Also available for copper to copper connections—a WSB)

K-1 Jumper Clamp
(Also available for aluminum, steel, or copper to similar conductor)



A-111 Armor Rod Jumper Clamp
(Also available for aluminum to aluminum connections.)

WEAVER HOT LINE CLAMPS are cast of high strength **HERCULOY** to withstand maximum tightening without distortion. This exceptionally hard metal also produces a smooth, free running thread which efficiently converts the tightening torque to pressure on the conductor. **HERCULOY** also eliminates freezing of the tightening bolt so that clamps are easily removable.

Both main line and tap wire connections are secured with **SHAKEPROOF** lockwashers to provide permanent high pressure, trouble-free connections which won't loosen under vibration.

WEAVER HOT LINE CLAMPS are made in only two sizes which accommodate a large range of connections. There is no need to stock a big variety of sizes when you use **WEAVER.**

FOR TOP QUALITY AT LOWEST COST . . . YOU CAN'T BEAT WEAVER HOT LINE CLAMPS!

Write for the latest Weaver Catalogue

JAW

J.A. WEAVER CO.

2110 HOWARD ST. ST. LOUIS 6, MO.

U·S·S Creosote Oil

MEETS EVERY SPECIFICATION

U·S·S CREOSOTE OIL is prepared to comply with the specifications of the American Wood Preservers' Association and the American Railway Engineering Association. There's no batch-to-batch variation in quality, for U·S·S Creosote Oil is the product of continuous processing in the world's largest tar distillation plant.

And, no matter how exacting *your* requirements may be, one car will convince you that U·S·S Creosote Oil fills the bill. Its deep, effective penetration and high toxicity add years of life to treated wood . . . sharply reduce your future replacement costs.

Five sales offices from coast to coast assure you prompt service when you specify U·S·S Creosote Oil. If you'd like additional information on this time-tested preservative, get in touch with the nearest of these offices today.

COAL CHEMICAL SALES DIVISION
UNITED STATES STEEL CORPORATION SUBSIDIARIES
71 Broadway, New York 6, N. Y.
208 South La Salle St., Chicago 90, Ill. 1509 Terminal Tower, Cleveland 13, Ohio
Brown-Marx Building, Birmingham 2, Ala. 25 Beale St., San Francisco 5, Calif.

USS

CREOSOTE OIL

UNITED STATES STEEL

BUS CONDUCTOR DESIGN

FACTORS and PROBLEMS

No. 3. Effect of Cross-Sectional Shape in Bus Bar Design

Good bus design demands ability to carry full loads safely, to keep temperatures within the specified limit and to provide the necessary mechanical strength—at the lowest possible cost consistent with all three.

To meet all combinations of these requirements, ANACONDA Bus Equipment is produced as flat bars, tubes, channels, angles and cables. Each possesses its own electrical and mechanical characteristics.

To help you plan your bus installation and select the right bus design is our Technical Department's job. Ask for a copy of "ANACONDA Copper Bus Conductors" and let us know how we can help you. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

50130

Anaconda has many years of bus conductor experience

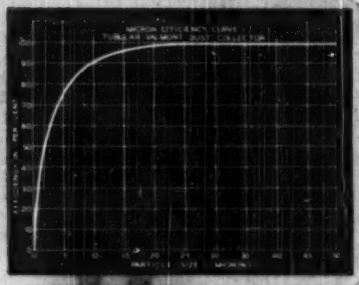
Anaconda has done much to improve bus conductor practice—is organized to help you plan your installations. Today ANACONDA *products and technicians are cooperating effectively throughout the entire field of power generation, distribution and application to provide bus conductors that will afford maximum capacity, security and economy for any specified job.*

Carry the load with ANACONDA® Bus Conductors

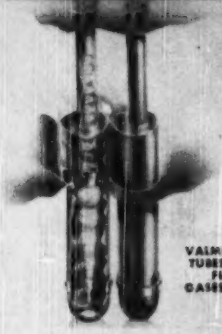
THE VALMONT TYPE S COLLECTOR

CATALOG DIGEST

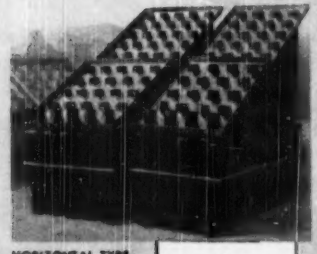
The following information is taken from the New Bulletin on P-D Valmont Type S Collector. For Complete Bulletin containing dimension tables, sizes, nomographs and suggested installation plans, write our Project and Sales Engineers.



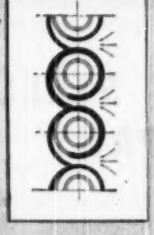
P-D EFFICIENCY CURVE



VALMONT TYPE S TUBES SHOWING FLOW OF GASES AND INLET



HORIZONTAL TYPE TUBE SHEET SECTIONS KNOWN AS "UNI-BLOCS"



METHOD OF NESTING TUBES—REDUCES TURBULENCE . . . SAVES SPACE

HIGH EFFICIENCY—The outstanding contribution to higher efficiency in the P-D Valmont Type S is the inlet slot design. A patented development of Prat-Daniel, this inlet is high and narrow, reducing the radial distance of dust-travel. To explain its effect on dust collection, we quote from Cyclone Dust Collector Design, by Melvin W. First, Paper No. 49-A-127, presented at the Annual Meeting of the American Society of Mechanical Engineers, Nov. 27—Dec. 2, 1949, page 14.

> "Entry width is an important variable in cyclone efficiency, as it controls the stream width. This, in turn, directly controls the radial distance particles must traverse to reach the cyclone wall and be separated by centrifugal force. The smaller the radial distance to be traversed, the lower the tangential velocity needed (less energy loss) and the smaller the particle that can be successfully separated for a given flow rate."

LONG LIFE—Extensive tests were made to determine the wear factor. All types of abrasive dusts were run at accelerated speeds, against various metals simultaneously and steel proved to be the most resistant to erosion.

Another long life factor is the lower velocity required due to the small tube diameter. It is a well-known fact that reduction of tube diameter produces higher centrifugal force. Thus, efficiencies are maintained at the lower load ranges.

MASS PRODUCTION METHODS—The P-D method of "uni-bloc" construction permits manufacture and assembly of sub-sections at the factory. These are shipped to the field and easily erected, either vertically or horizontally, to fit the layout. Savings in cost of erection are thus realized yet the collector is "tailor assembled" to fit the installation requirements.

SMALL SPACE FACTOR—Because of close nesting of tubes possible in P-D Valmont Type S Collectors, the space required for this apparatus is much less than conventional collectors. In many cases, P-D units have been fitted into spaces that could accommodate no other type.

The Thermix Corporation, our Sales and Project Engineers are specialists in the art of dust collection. Consult them about your dust problems.

Project and Sales Engineers

THE THERMIX CORPORATION

Greenwich, Conn.

(Offices in 28 Principal Cities)

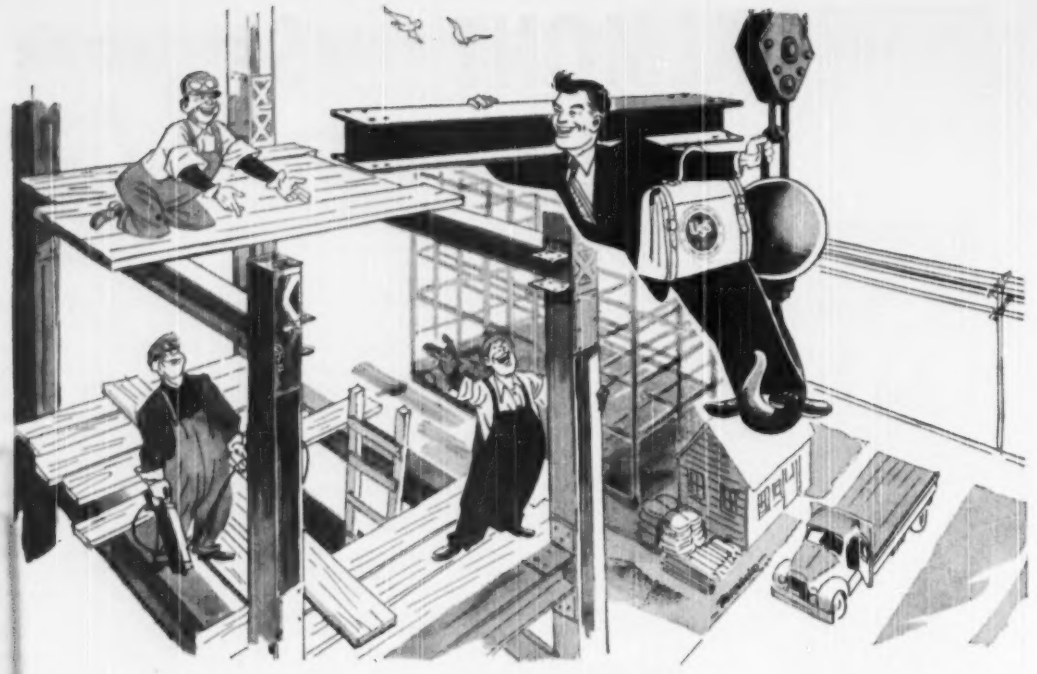
Canadian Affiliates: T. C. CHOWN, Ltd.

1440 St. Catherine St. W., Montreal 25, Quebec; 50 Abell St., Toronto 3, Ontario

PRAT-DANIEL CORPORATION

Designers and Manufacturers of Power Plant Equipment for Over 25 Years

75-6 WATER STREET • EAST PORT CHESTER, CONN.



"Service when you want it!"... that's only one of the things we mean by Service Plus!

BARS · PLATES · FLOOR PLATE
STRUCTURALS · SHEETS
STRIP · REINFORCING BARS
▲
STAINLESS
ALLOY STEELS
ALUMINUM
▲
TOOLS · EQUIPMENT
MACHINERY

● Once in a while, a customer finds himself short of an essential piece of steel or equipment. That means delay, perhaps layoffs, if the item is not delivered immediately. And that is when *Service Plus* gets a severe test.

We're glad we have passed these important tests. Some customers have commented: "I like your prompt service." "You have fast and competent service." We hope our customers never find reason to change these opinions.

Service Plus means more than speed. It also means we have in stock a wide range of steels in a variety of shapes and sizes, and we are ready to give courteous, efficient attention to your particular steel supply problem.

WHEN YOU DEAL WITH US, YOU GET Service Plus!

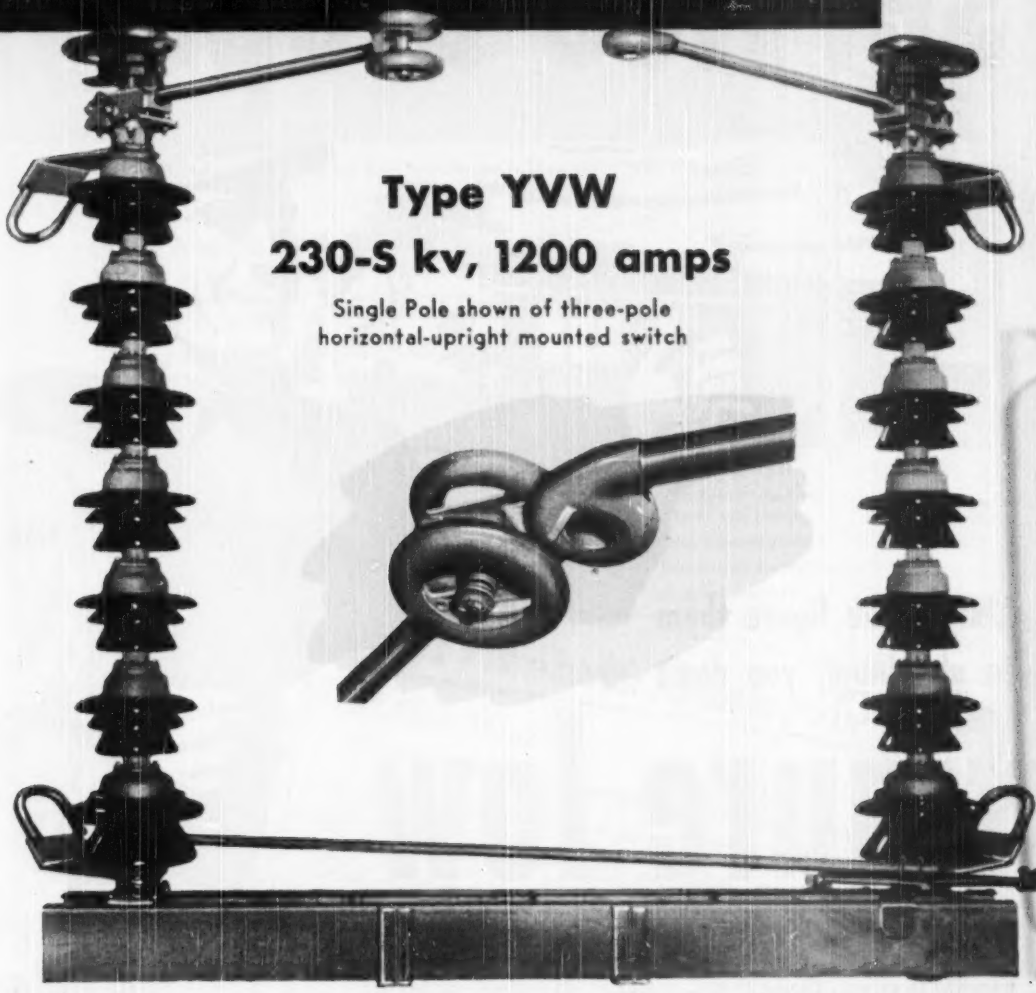
UNITED STATES STEEL SUPPLY COMPANY

USS

Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO
CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH
PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Sales Offices: KANSAS CITY, MO. · PHILADELPHIA · ROCKFORD, ILL. · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

Pacific Features ★



Type YVW

230-S kv, 1200 amps

Single Pole shown of three-pole horizontal-upright mounted switch

★ Solid-silver to solid-silver high-pressure contacts.

★ Corona Shielding.

★ Easy blade adjustment.

★ Spill gaps coordinate insulator flashover with switch open-gap flashover. Help keep arcs away from insulator porcelain.

★ Extremely rigid, heavily reinforced base combined with massive bearings maintain tall insulator stacks in positive alignment.

Get All Facts . . .

Call **PACIFIC ELECTRIC MFG. CORPORATION**

565 THIRD STREET SAN FRANCISCO 24 CALIFORNIA · P. O. BOX 419 GARY INDIANA

Other Representatives in Principal Cities

service drops

Unless you figure them in aluminum, you don't

figure low

Figure a thousand feet of service drop cable both ways—in aluminum and in copper. Then take a good look at the savings you can get with *aluminum*.

For names of manufacturers and copy of "Questions and Answers About Aluminum Conductors", call your nearby Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 1786F Gulf Bldg., Pittsburgh 19, Pa.

Insulated **Aluminum Conductors**

ALCOA

of ALCOA EC ALUMINUM are made by leading manufacturers

neoprene notebook

FACTS ABOUT NEOPRENE FOR THE ENGINEER

Published at Wilmington, Delaware, by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co. (Inc.)

DYNAMIC PROPERTIES OF Neoprene Vulcanizates

Recent studies of the dynamic characteristics of neoprene vulcanizates have extended practical applications for neoprene products in many fields

SINCE 1930 not only has the use of elastomers in dynamic applications increased, but much progress has been made in the development of test methods for determining their dynamic properties.

Because neoprene was specifically developed to overcome many of th limitations of natural rubber, it h been found useful in dynamic app cations where service conditions too severe for satisfactory perfo ance of natural rubber parts.

The use of elastomeric comp tions in dynamic applications us requires a knowledge of the foll four properties: deflection under load; resilience; creep under sta dynamic conditions; and heat up. Of these, only resilience build-up can actually be co dynamic properties. Thus, d under load and creep will tioned only briefly.

Although measured stat load-deflection characteri composition are extremely in the design of vibrati since they determine the quency of any mounting composition is used. The natural frequency of elastomeric springs decreases as the deflection increases. This, in turn, affects isolation efficiency—high efficiency being characteristic of mountings having a low natural frequency.

characteristic of all ma- forma-

that compo-

Adapted from "The Dynamic Char Vulcanizates" by N. L. Catton, R W. N. Kern of the Du Pont Rubb ered before the Division of Rubber Chemical Society in Los Angeles, Cali

DU PONT

Better Things for Better Living . . . through Chemistry

IN THIS ISSUE:

Dynamic Properties of Neoprene Vulcanizates . 273
Down Under the Farm . . 275
Solid Tires for the Food Processing Industry . . . 276
Better Vibration Control . . 278
Transformers for the Tropics 279
Neoprene Abstracts 280

Here's Profitable Reading for You!

✓ New Products
✓ New Methods of reducing maintenance costs
✓ New Solutions of production problems
✓ New Improvements on old products

Put your name on our mailing list NOW for your FREE subscription

CLIP THIS COUPON

E.I. DU PONT DE NEMOURS & CO. (INC.)
RUBBER CHEMICALS DIVISION, G6
WILMINGTON 98, DELAWARE

Please send me free issues of the Neoprene Notebook

Name _____
Firm _____ Position _____
Address _____

The Best POLE LINE CONSOLIDATED

YOUR CONSTRUCTION REQUIREMENTS PROMPTLY FILLED WITH

LIFE-SPAN

Treated

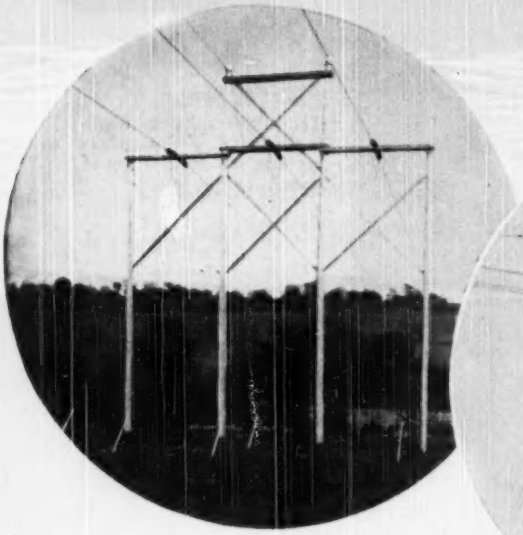
WESTERN RED CEDAR POLES

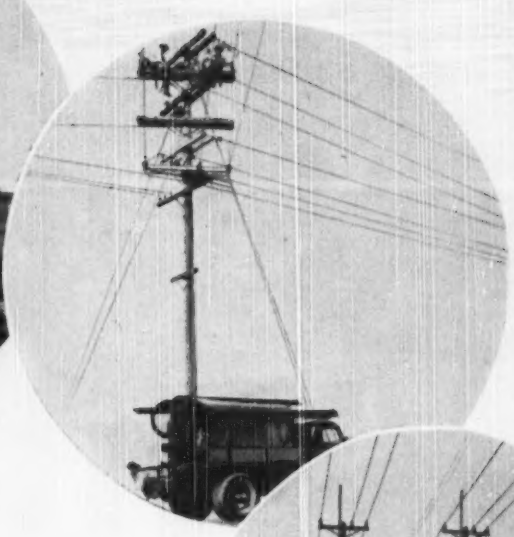
If your plans call for high tension or distribution pole line construction soon or for construction to begin at some future date, you'll be glad to know that your pole needs will be ready for you at Consolidated. Large quantities of Nature's No. 1 poles, Western Red Cedar, are being treated the LIFE-SPAN way, daily. Whether your approaching construction job is big or one requiring only a carload of poles, Consolidated can give you prompt delivery.

Actual photo of New Western Red Cedar Stocks in CONSOLIDATED Yards. Photo taken January 3, 1950.

CONSTRUCTION begins at TREATING CO.

MINNEAPOLIS
MINNESOTA





Built by NATURE...

Perfected by LIFE·SPAN

Man has searched but has never found a finer specimen for power poles than Western Red Cedar. Man has tried but has never developed a better pole preservative process than LIFE-SPAN. Together they offer an unbeatable combination.

Straight, strong, lightweight Western Red Cedar poles treated the LIFE-SPAN way assure you of dependable service up to pole line obsolescence. Linemen prefer LIFE-SPAN poles because they are safe to work on, easy and clean to handle and to climb. Utility companies like them because they offer long, dependable service unmatched by any other pole. LIFE-SPAN Poles are bound to build good public relations for the companies who use them.

TO BE SURE, TO BE DOUBLY SAFE . . . SPECIFY LIFE-SPAN WESTERN RED CEDAR POLES.

The same LIFE-SPAN treatment is also available for Fir, Western Larch and Lodgepole Pine.

Sold only by the following:

PAGE & HILL, INC.
Minneapolis, Minnesota
50 Church Street, New York, N.Y.

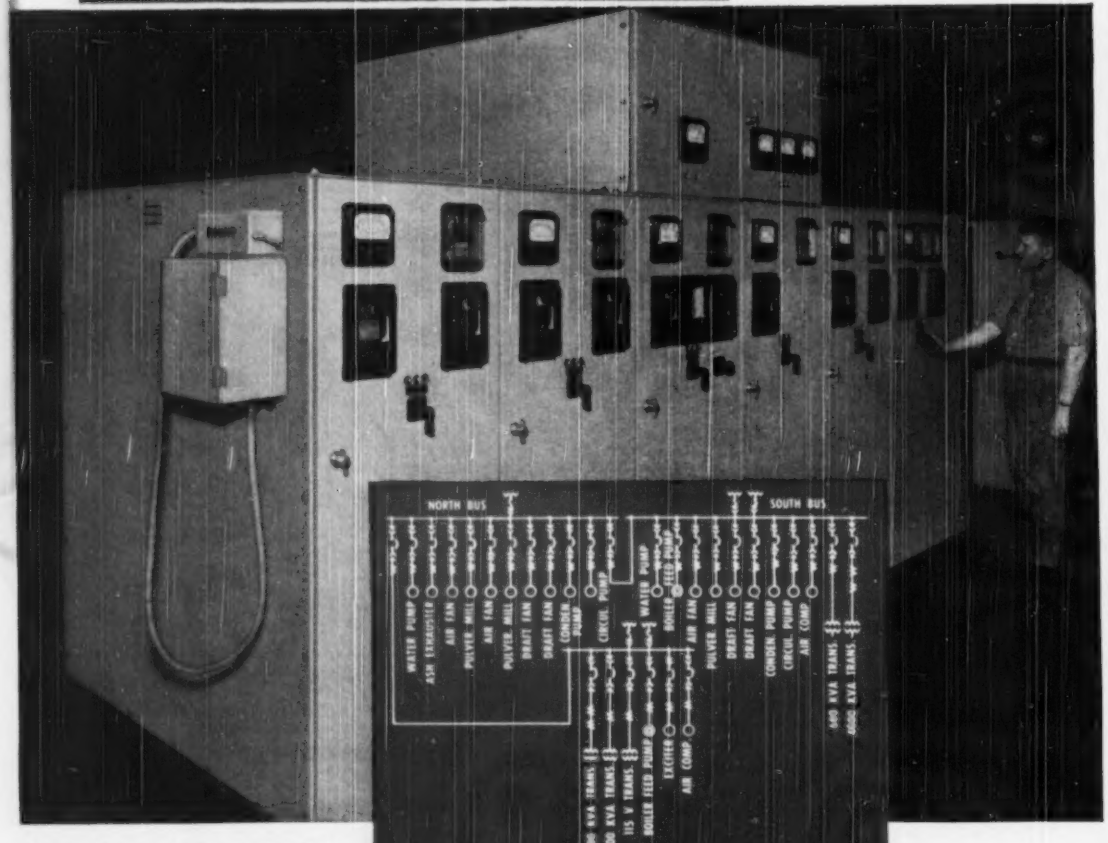
B. J. CARNEY & CO.
Spokane — Minneapolis

SCHAEFER-HITCHCOCK CO.
Sandpoint, Idaho
Suppliers for Joslyn Mfg. & Supply Co.

NAUGLE POLE & TIE CORP.
Chicago, Illinois

Power for Washington, Allis-

The nation's capital city, Washington, D. C., and neighboring area use 500,000 kw of power.



Magnetic blowout plus natural thermal effect give rapid circuit interruption in *Ruptair* circuit breakers. 5 kv metal-clad switchgear, Unit 13, Benning Station.

2300 v one line diagram, Benning Generating station, (Unit 13), Potomac Electric Power Co.

D. C. Flows Through Chalmers Switchgear

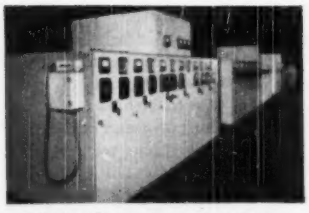
At Potomac Electric Power Company's Benning (Unit 13) and Buzzard Point (Unit 4) Generating Stations standard Allis-Chalmers 5 kv metal-clad switchgear protects vital auxiliary electrical equipment.

EXCLUSIVE SUPPLIER of power for Washington, D. C. and 46 neighboring communities, Potomac Electric Power Co. distributes some 500,000 kw through 7082 miles of cable and 15,417 miles of overhead wire to its 225,000 residential and 38,000 commercial users.

It's a *big* job . . . calling for a well integrated system and thorough protection behind generating and distribution equipment. Here is how Potomac Electric Power Co. is getting that protection at their Benning Station (Unit 13) and Buzzard Point (Unit 4) plants.

The former is equipped with Allis-Chalmers metal-clad vertical lift switchgear incorporating 31 *Ruptair* circuit breakers; the latter has A-C switchgear housing 23 oil circuit breakers. And soon to be installed at their Georgetown substation are new units of A-C 15 kv indoor air blast switchgear.

★ ★ ★



Station service 5 kv, 100,000 kva metal-clad vertical lift switchgear with *Ruptair* circuit breakers on Unit 13, Benning Station.

A-C switchgear here at Potomac Electric Power Co., (and all A-C installations) is completely metal-clad for greatest protection to both personnel and equipment. Steel barriers separate the high voltage sections. Breakers have self-coupling primary and secondary contacts that automatically disconnect when the breaker is lowered. Postive interlocks prevent removal or insertion of closed breaker. Shutters automatically close off primary terminals when breaker is removed.

Your Choice of Circuit Breakers

Ruptair breakers — the only vertical lift breakers with horizontal contact separation — combine natural thermal effect of the arc with strong magnetic blow-out field for rapid circuit interruption.

One of two A-C 400 hp squirrel cage motors driving induced draft fans on Unit 13.

DZ-40 oil circuit breakers — down-break type — are designed for low arc energy and low oil deterioration. Constructed on double break per phase principle.

Utilities Specify A-C Switchgear

If reliable circuit protection and best performance for your electrical equipment are among your plans for your system, it will pay *you* to use standard A-C switchgear. It is standardized, composed of matched units so you can expand easily to meet increasing loads. Shipped assembled, these prefabricated units guarantee low installation cost in any application, industrial or utility.

To learn more about Allis-Chalmers switchgear, call your A-C office. A-2957

Ruptair is an Allis-Chalmers trademark.

ALLIS-CHALMERS, 932A SO. 70 ST. MILWAUKEE, WIS.

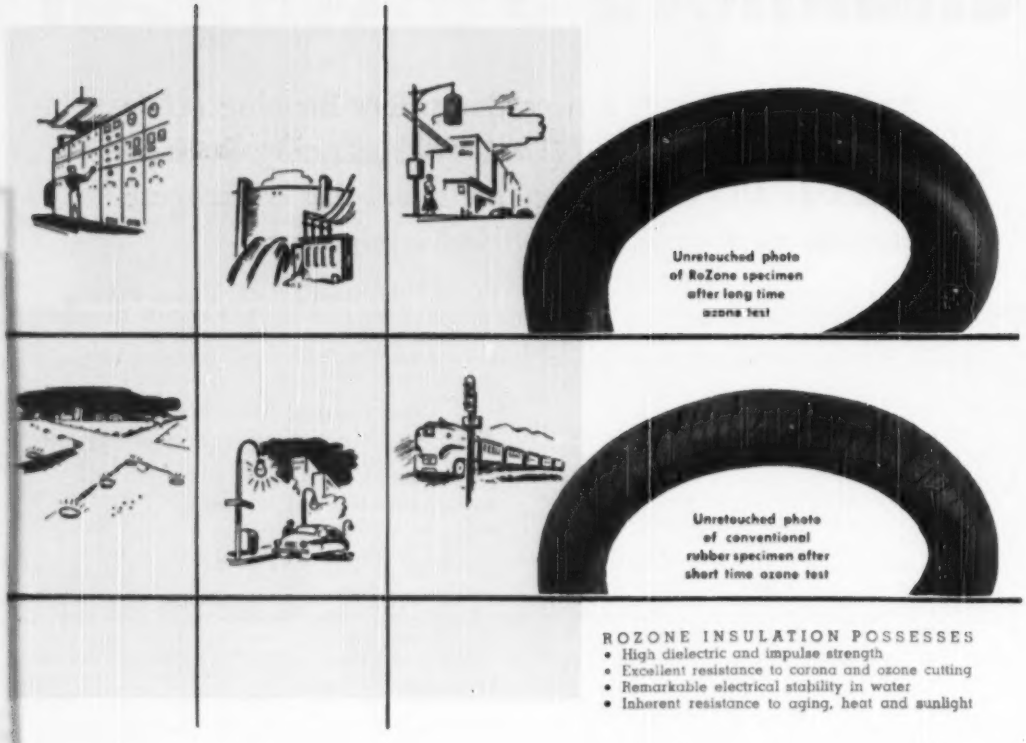
ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

Rome RoZone

THE SUPERIOR OZONE-RESISTANT INSULATION

adds years to cable life...


Unretouched photo of RoZone specimen after long time ozone test
Unretouched photo of conventional rubber specimen after short time ozone test

ROZONE INSULATION POSSESSES

- High dielectric and impulse strength
- Excellent resistance to corona and ozone cutting
- Remarkable electrical stability in water
- Inherent resistance to aging, heat and sunlight

The photos above tell their own story. At the top is RoZone insulation after being subjected to an ozone atmosphere for a period well in excess of specification requirements. Note that there is no deterioration of compound... no surface checking. Below is conventional rubber insulation after a much shorter ozone test. These unretouched photos demonstrate clearly the superiority of RoZone under conditions of ozone cutting when higher voltages are involved... all of which means longer service life and greater dependability.

Specifying RoZone pays off on many installations. For example, high voltage power circuits... station or supervisory control signal cables... street lighting cables... airport lighting and control cables as well as general purpose wiring where high quality and long life is paramount.

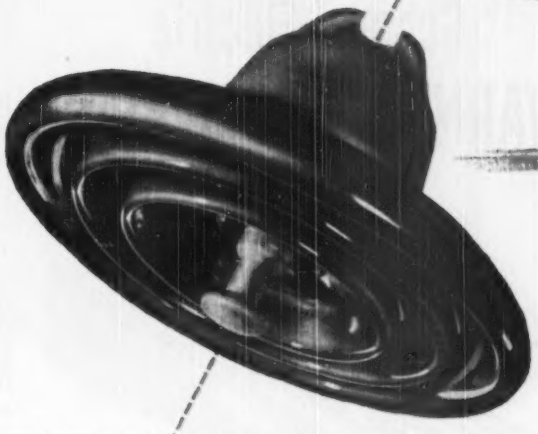
Write for specification RO-4 today and see why leading utilities, industrials and railroads are specifying RoZone.

It Costs Less to Buy the Best...
Buy Rome RoZone

ROME CABLE
Corporation
ROME · NEW YORK
From Bar to Finished Wire

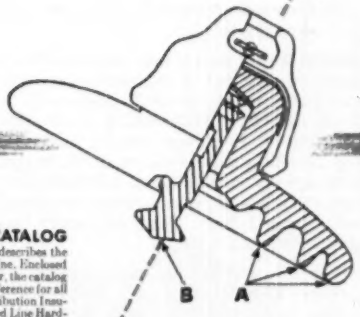
ROME CABLE ROME, N.Y.

THOMAS details make a big difference in insulator life



No one part of an insulator is more important than another. Long life is dependent upon the proper balance of all electrical and mechanical characteristics. This attention to detail and manufacturing "know-how" does not come overnight. Thomas has been manufacturing porcelain insulation for 77 years and is still seeking better and improved methods of serving the electric utility industry . . . is still refining its products for more efficient insulation of transmission and distribution lines.

To you as a user of insulators, these refinements mean extra years of trouble-free performance. Specify Thomas Porcelain for all your insulator requirements . . . There are no "weak links" in Thomas Insulators.



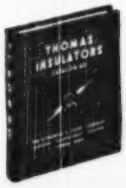
This cutaway view is a Thomas Ten-Inch Suspension-Strain Insulator, 15,000 pounds M. & E. rating. Illustrated are two of the many plus characteristics evident in all Thomas made porcelain insulators.

A—Corrugations are rugged and thick . . . tough enough to withstand malicious or accidental breakage. Deep and rounded, they provide maximum leakage surface. Rolled edges prevent chipping and breakage. Thomas design is right . . . Thomas porcelain is tough.

B—Forged steel studs are set and held fast by high grade cement. Perfect alignment is assured, for all parts are jig assembled . . . clamped tight until cement sets. Complete interchangeability, uniform quality and long life are guaranteed with Thomas Insulators.

THIS FREE CATALOG

. . . illustrates and describes the complete Thomas line. Enclosed in a loose-leaf binder, the catalog provides a ready reference for all Transmission-Distribution Insulators and Associated Line Hardware. New insertions as issued are sent to all catalog holders.



The R. Thomas and Sons Co.

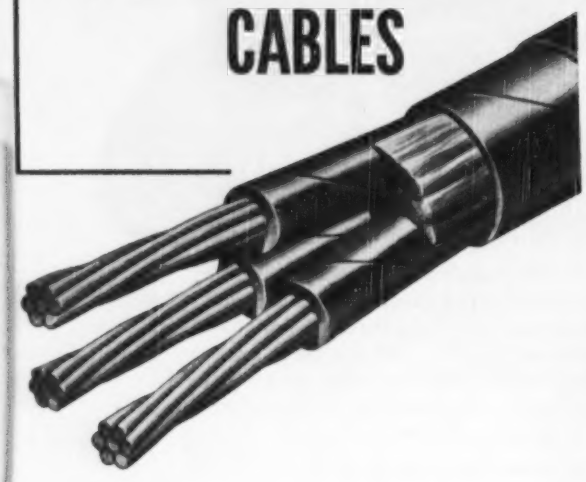
LISBON, OHIO

NEW YORK CHICAGO

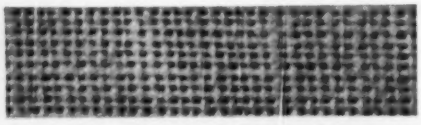
AGENTS IN PRINCIPAL CITIES

"No. 1799" means high quality

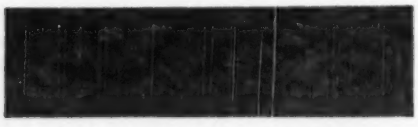
General Electric VARNISHED-CAMBRIC CABLES



1. Special untreated cotton cloth utilized in the manufacture of G-E No. 1799 varnished-cambric insulation.



2. Enlarged section of cloth. The large holes enable the cloth to absorb the maximum amount of varnish.



3. Finished varnished-cambric tape completely impregnated with varnish, provides a high degree of insulation.

That's right, when you specify General Electric cables with the famous G-E No. 1799 varnished-cambric insulation, *you know you get high quality* in every foot—*uniformity* in the thickness and strength of the insulating wall . . . high dielectric strength . . . excellent resistance to high operating temperatures.

Three factors—resulting from nearly 50 years of General Electric research and development—are primarily responsible for the excellent electrical qualities of G-E No. 1799 varnished-cambric insulation. First, a special cotton cloth, which the varnish penetrates easily and saturates thoroughly. Second, General Electric's own tough, yet flexible, varnish. Third, the careful baking processes used in the application of varnish to cloth.

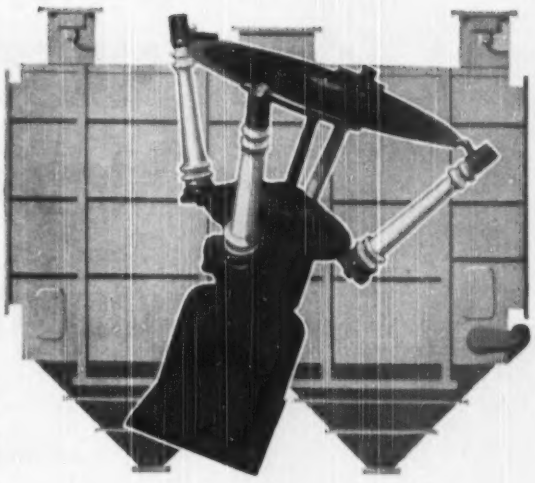
The ability of varnished-cambric cable to withstand high conductor temperatures continuously can be judged by its being able to remain pliable when subjected to extreme temperatures over long periods of time. The performance of G-E No. 1799 varnished-cambric insulation under rigorous conditions proves that many years of uninterrupted service can be realized from this type of cable construction.

G-E varnished-cambric cables are available in 3 basic types:

BRAIDED—for power and control circuits, exposed or installed in conduit in dry locations; and for transformer and apparatus power leads. **INTERLOCKED-ARMOR**—for overhead distribution in power plants, factories, and the like. This cable requires no raceways, permits speedy installations. **LEADED**—for generator leads and power wiring overhead or in underground ducts. Ideal for heavy loads in wet or dry locations.

For information on the complete line of General Electric varnished-cambric insulated cables, contact your local G-E Construction Materials distributor or district office. Section W4-627 Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC



ELECTROSTATIC ...YES

DESIGN-STATIC ...NO

The advent of the Buell 'SF' Electric Precipitator breathes new life into precipitator design. High efficiency recovery of ultra-fine dusts, fumes and vapors takes on new operating ease and reliability.

Both management and plant engineers will find in the Buell 'SF' Precipitator sound reason to anticipate superior performance. Advanced design provides self-tensioned Spiralectrodes (patented), and incorporates an exclusive StediFlow dust-fall principle. Either as Precipitator alone, or in combination with Buell van Tongeren cyclones, there is definite operating advantage.

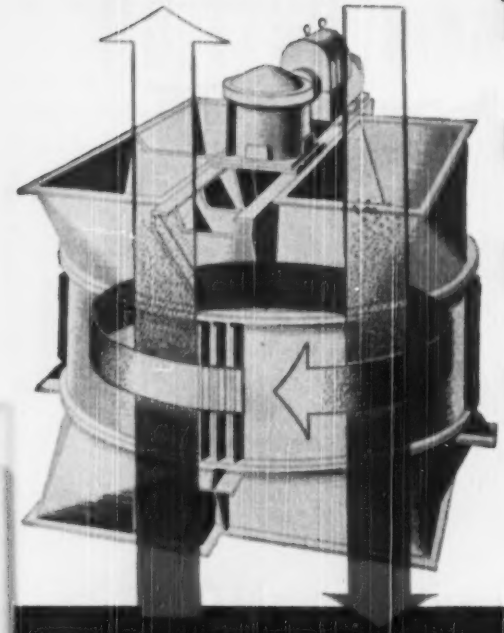
Like all Buell Dust Collection Systems, each 'SF' Precipitator installation is custom-engineered for the job it will do...backed by a realistic fractional efficiency guarantee...produced against a background of world experience in dust collection.

For general information or specific performance data, write Buell Engineering Co., Inc., 70 Pine Street, New York 5, N. Y.

ELECTRIC CYCLONIC

buell

Engineered Efficiency in **Dust Collection**



this preheater can save you money whatever your fuel

the *Ljungstrom* AIR PREHEATER

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

All fuels burn better with preheated combustion air, and it is a "must" for many of them, such as high moisture powdered coal. In addition, the *continuous regenerative counterflow* principle of Ljungstrom permits reliable operation at low exit gas temperature. This assures the greatest possible heat recovery . . . reduces the amount of fuel required.

The efficiency and reliability of the Ljungstrom air preheater is a matter of record in industrial and utility plants throughout the country. That is why every year a constantly increasing percentage of the installed boiler capacity is equipped with Ljungstrom air preheaters.

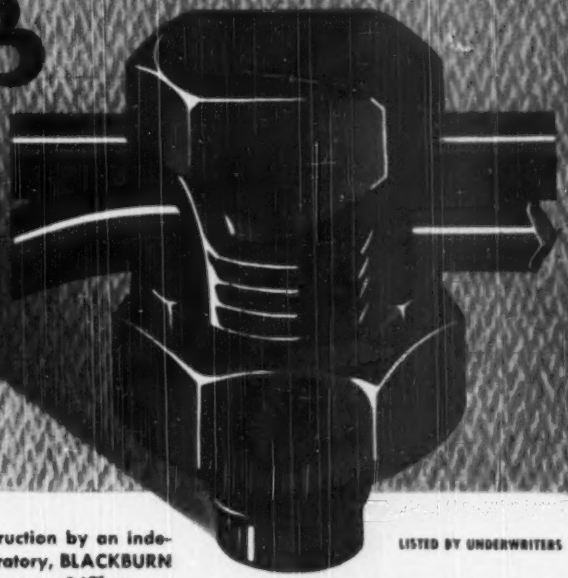
If you are planning a new installation, or modernizing your present one, our engineers will welcome the opportunity to show you how the Ljungstrom can raise the efficiency of your plant.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

BLACKBURN
Hi-Strength
CONNECTORS

TEST 1/3 STRONGER!



When pulled to destruction by an independent testing laboratory, BLACKBURN Hi-Strength Connectors were 34% stronger than the average of seven other leading makes. They were 14% above the next strongest connector and 62% better than the weakest of the connectors tested.*

Tests also show that Blackburn Hi-Strength Connectors produce a very high pressure connection — several times the pressure exerted by many other brands of the split bolt type. The extra strength of Blackburn Connectors holds the high pressure connection indefinitely. That is why Blackburn Connectors are trouble-free on the lines. That is why Blackburn Connectors are always preferred by those who have used them. That is why Blackburn Connectors are No. 1 in their field today.

LISTED BY UNDERWRITERS

*Two samples of each size from 6 to 4/0 inclusive were tested for each brand including Blackburn. Each connector was assembled over two yokes which were put into the jaws of a standard tensile testing machine. Each connector was then pulled to destruction. The average breaking strength of Blackburn Connectors was 34.3% greater than the average of the 7 other leading brands representing over 90% of all the connectors produced.

JASPER BLACKBURN PRODUCTS CORP.

Builders of Quality Connectors for 15 Years • First, Madison & Clinton Sts., St. Louis 6, Mo.

Phone CE-3007

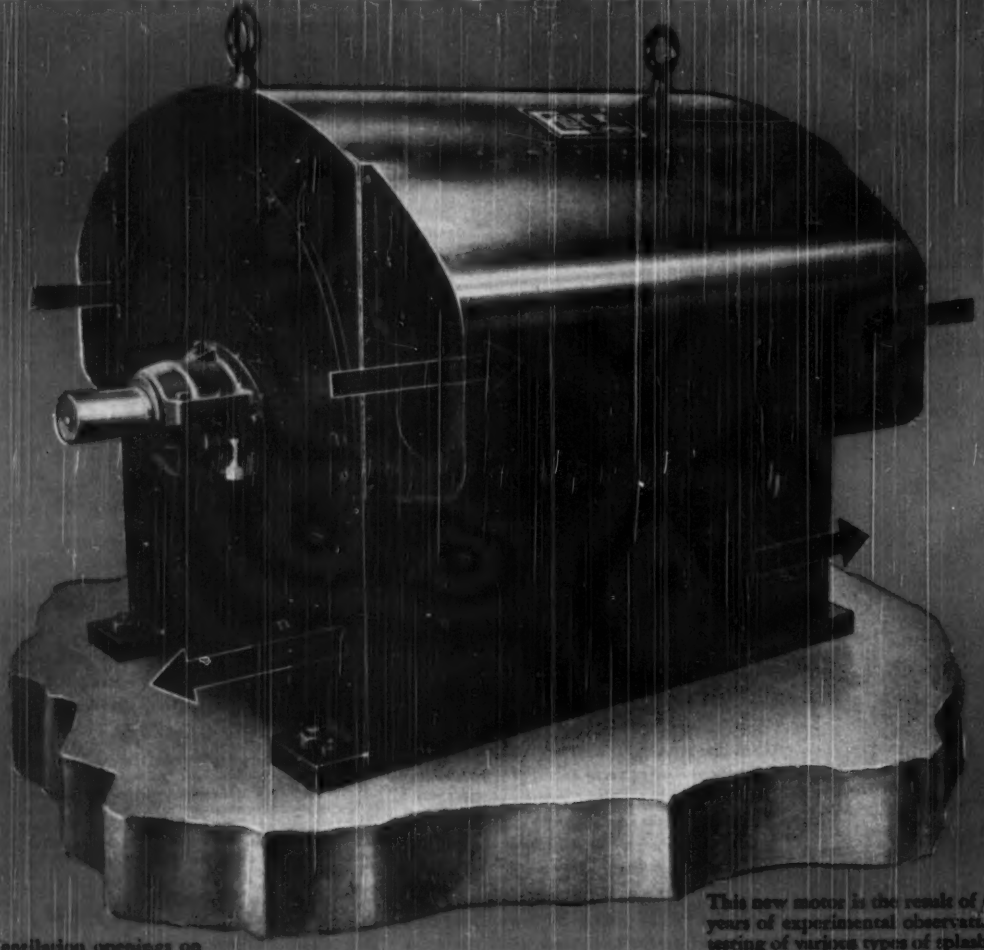
A revolutionary new

ELLIOTT

FABRI-STEEL

outdoor

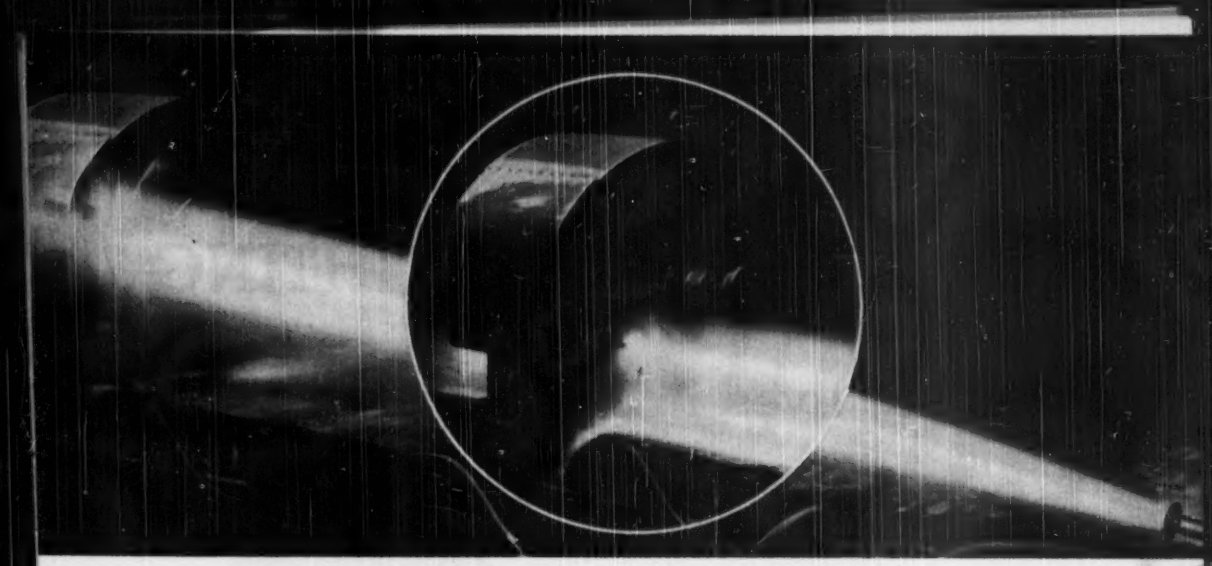
SPLASH-PROOF MOTOR



Ventilation openings on both ends of motor, similarly located.

This new motor is the result of [illegible] years of experimental observation and testing of various types of splash-proof motors actually installed outdoors under severe conditions, such as salt fogs, hurricanes, sand storms, etc.

IN MOTORS, IT'S ELLIOTT *all*



High-velocity wind-borne rain can be driven straight through air inlet openings, or air discharge without entering interior of the motor.

- Protected from all directions against wind-driven rain.
- Wind-driven foreign matter blows straight through inlets and outlets without entering motor.
- Inlets and outlets baffled internally—air taken into motor at low velocity.
- Screens or filters may be added to inlets.
- Sealed split ring-oiled sleeve bearings or antifriction bearings.
- Stator coils with mica wrapper on slot portion for 2300-volt and higher class "A" insulation.
- Stator coils are vacuum-pressure impregnated.
- Stator and coils after winding given one complete dip and bake, and end turns two additional dips and bakes.
- Foundation may be a simple, economical slab. Does not need to be special or have expensive cored openings.
- No objectional air recirculation.
- All steel frame and brackets coated inside and out with rust inhibiting finish.

Built in sizes 150 to 2000 hp, 4 to 14 poles.

Contact nearest Elliott Company District Office for details.

L-800 a

DISTRICT AND BRANCH OFFICES

Atlanta 3 ..... 310 Haas-Howell Bldg.
Boston 10 ..... 75 Federal Street
Buffalo 2 ..... 807 Crosby Building
Chicago 6 ..... 20 N. Wacker Drive
Cincinnati 2 ..... 1218 Enquirer Bldg.
Cleveland 14 ..... Nat'l City Bank Bldg.
Denver 16 ..... 4949 Colorado Blvd.
Detroit 26 ..... 1820 Dime Bank Bldg.
Houston 2 ..... 713 M & M Building

ELLIOTT COMPANY

RIDGWAY DIVISION, RIDGWAY, PA.

Plants at: JEANNETTE, Pa., RIDGWAY, PA.
AMPERE, N. J., SPRINGFIELD, O., NEWARK, N. J.

Kansas City 6 ..... 805 Midland Building
Los Angeles 15 ..... 714 W. Olympic Blvd.
Milwaukee ..... 744 N. 4th Street
Minneapolis 2 ..... 830 Pillsbury Building
Newark ..... 4th Avenue and 13th Street

New York 7 ..... 225 Broadway
Philadelphia 2 ..... 801 Morris Bldg.
Pittsburgh 19 ..... 718 Frick Building
San Francisco 4 ..... 1504 Russ Bldg.
St. Louis 3 ..... 1221 Locust Street
Seattle 1 ..... 1101 Vance Building
Tulsa 3 ..... 616 McBirney Building
Washington 1, D. C.
1101 Washington Gas Light Bldg.
Wilmington 7
Industrial Trust Building

Representatives in Foreign Offices

the way from 1 hp up . . .

"MODERN STREET LIGHTING

is saving lives in the area we serve"

says **Kinsey M. Robinson,** *President*
Washington Water Power Company
Spokane, Washington

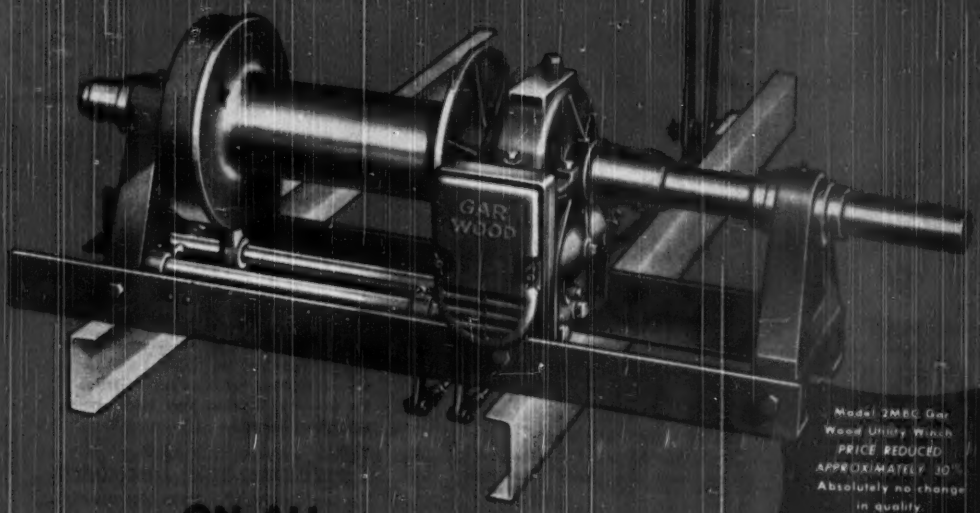
"RECORDS here show that on principal arterials in Spokane where 56 deaths had occurred in 11 years, modern lighting reduced traffic fatalities 76 per cent. And all this despite a 50 per cent increase in traffic volume. On one main thoroughfare, there were no fatalities.

"Promoting modern street lighting is not only the duty of a utility, it's good business, too."

FOR MORE FACTS... *Write for your free copy of "Planned Progress in Street Lighting".*

The Street and Traffic Safety Lighting Bureau, 155 East 44th St., New York 17, N. Y.

PRICES DOWN!



Model 2MBC Gar Wood Utility Winch
PRICE REDUCED APPROXIMATELY 30%
Absolutely no change in quality

ON ALL

GarWood

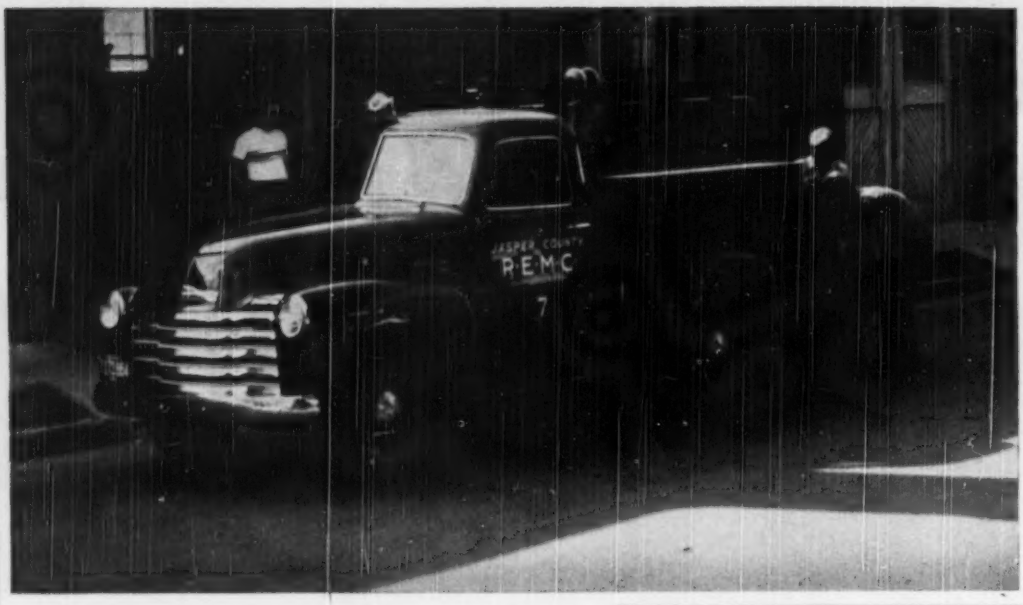
WINCHES, CRANES AND POLE DERRICKS

Prices are down, but quality is still up! Even though Gar Wood reduced prices from 6% to 30%, there has been no change in material, construction and design. The same high standard of Gar Wood quality is maintained in every detail. Gar Wood Winches, Cranes and Pole Derricks are by far the "best buy" you can make.

ASK YOUR NEARBY GAR WOOD DISTRIBUTOR OR BRANCH TO QUOTE ON YOUR NEXT ORDER. THEIR LOW PRICE WILL PLEASE YOU.

GAR WOOD INDUSTRIES, INC. Wayne Division, Wayne, Mich.

PRODUCTS—HOISTS • PUMP SCOOPS • WINCHES • CRANES • TRACTOR EQUIPMENT
RITCHIES • SHOVELS • TRUCKLOADERS • SPREADERS • TRUCK PATROLS



Top performance for tough jobs!

Chevrolet P•L Truck performance consists of many things. There is Chevrolet design—brilliant and functional—design with a purpose. There is Chevrolet construction—sturdy and dependable—for lasting usefulness.

And there is Chevrolet power—power to deliver the goods—more power than Chevrolet trucks ever had before. Two great valve-in-head engines—the Load-Master 105 h.p. and the Thrift-Master 92 h.p.—make these the most powerful Chevrolet trucks ever built.

These new P•L models are far ahead in features, too; yet they cost surprisingly little to buy, to operate, to maintain. And that adds up to value—the kind of outstanding value that year after year makes Chevrolet America's fastest selling truck.

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICH.

LEADING WITH ALL THESE PLUS FEATURES:

• **TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load** • **THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response** • **DIAPHRAGM SPRING CLUTCH for easy action engagement** • **SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting** • **HYPOID REAR AXLES—5 times more durable than spiral bevel type** • **DOUBLE-ARTICULATED BRAKES—for complete driver control** • **WIDE-BASE WHEELS for increased tire mileage** • **ADVANCE-DESIGN STYLING with the "Cab that Breathes"** • **BALL-TYPE STEERING for easier handling** • **UNIT-DESIGN BODIES—precision built.**

CHEVROLET P*•L*

ADVANCE-DESIGN TRUCKS

P*opularity L*eaders
Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—proof of the owner satisfaction they have earned throughout the years.

P*erformance L*eaders
The new Chevrolet P•L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

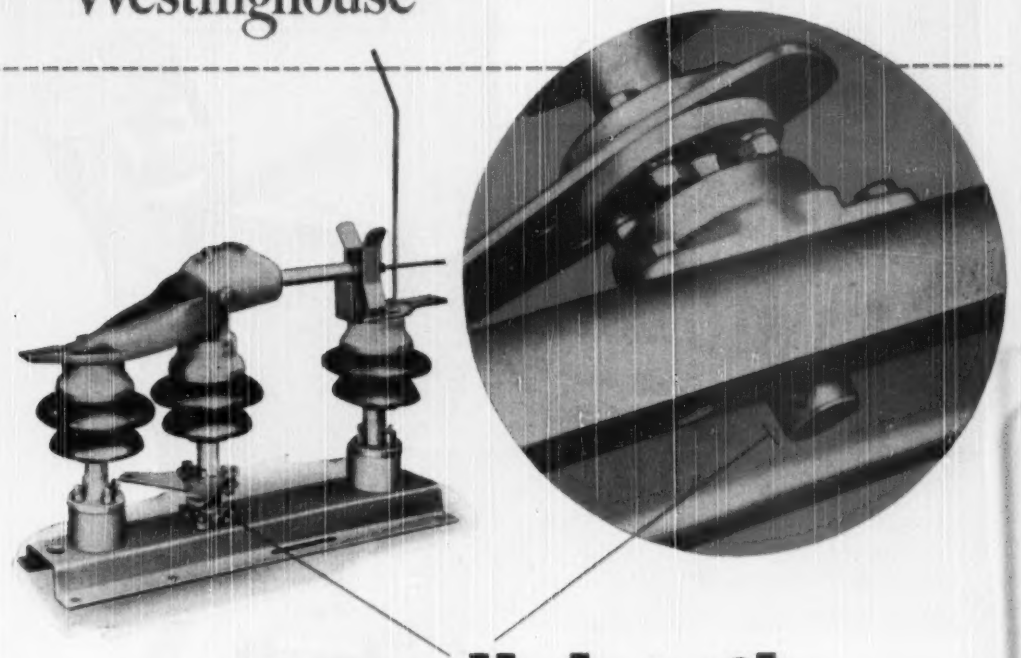
P*ayload L*eaders The rugged construction and all-around economy of Chevrolet P•L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P*rice L*eaders From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value, all add up to the lowest price for you.

CHEVROLET

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



a small detail

BUT... IT ELIMINATES A LARGE INSTALLATION PROBLEM

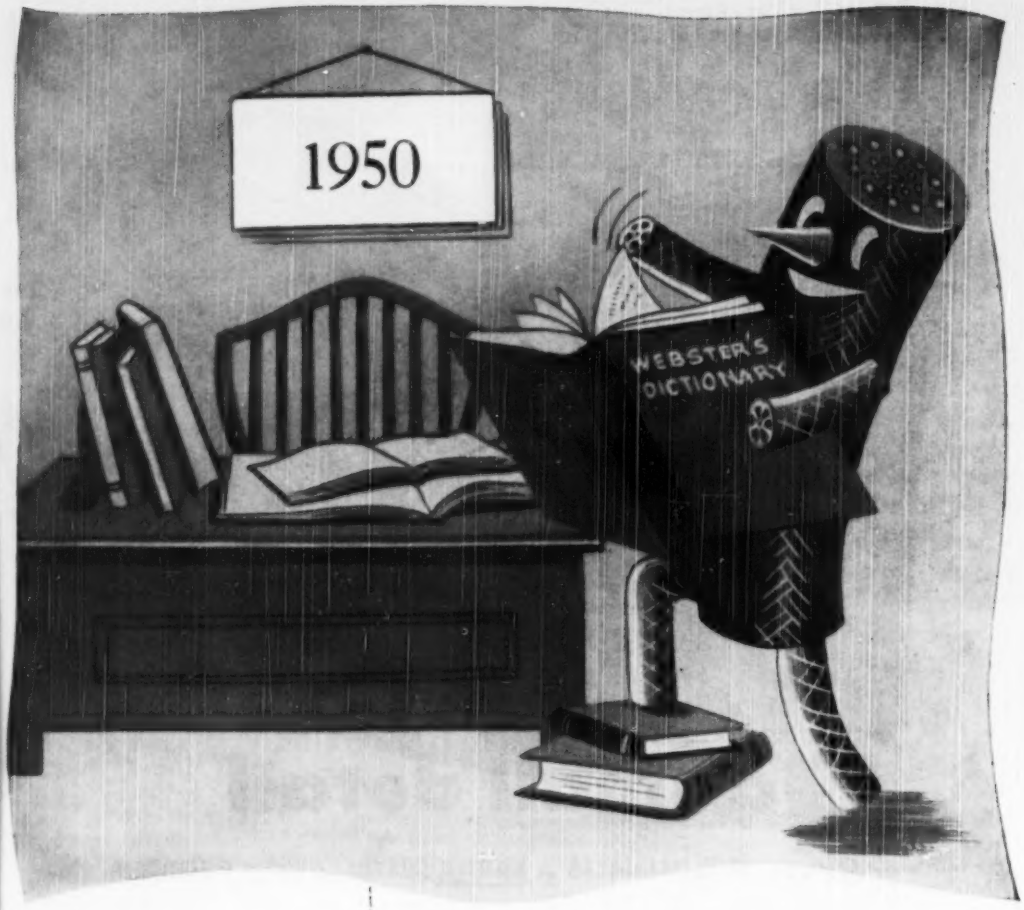
On any Westinghouse Type V Disconnecting switch, the rotating insulator bearing shaft does *not* extend below the base. Store 'em, install 'em—faster and easier. All switches have a flat mounting surface, free of any extensions that might get in the way of structure lacing, or make storage and handling a headache. This *minor* detail becomes a *major* factor in saving time and simplifying installation.

Count up these "little things" that make the *big* difference in switch value.

. . . Only 3 moving parts
. . . Completely enclosed hinge-end mechanism and contacts
. . . Long-life rigid contact for bridging hinge
. . . Simple one-piece break jaw
. . . Bearings lubricated for life
. . . Simple, bent steel base—flat mounting surface

Want more information? Get in touch with your nearby Westinghouse office or distributor. Ask for B-4241. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60700

Westinghouse
TYPE V
DISCONNECTING
SWITCHES



How long is "long life"?

TIME is testing Kerite insulation. But *Time* cannot be hurried. We have a sample of Kerite cable that was made just after the Chicago fire—and the insulation is still in first-class condition—both electrically and mechanically. After nearly 70 years, the dielectric strength is still excellent.

We don't know how long Kerite insulation will last—because our nearly 100 years is not long enough to find out.

But we do know that Kerite insulation gives remarkably long service *at remarkably low cost per year.*

Low maintenance, of course, goes right along with long life and dependable service . . . and that saves you money, too. Ask any Kerite user.

The Kerite we use today is the same that has withstood the test of time. Kerite engineers will be glad to help you take full advantage of its properties. Kerite insulated wire and cable is made for a full range of voltage ratings—and for aerial, surface, underground, or submarine applications, both indoors and outdoors. *The Kerite Company, 30 Church Street, New York 7, N. Y.*

Offices also at: 122 So. Michigan Avenue, Chicago; 582 Market Street, San Francisco; 714 W. Olympic Blvd., Los Angeles.

Kerite Insulation—Your Cable's Best Life Insurance

DAYS KERITE

KERITE CABLE

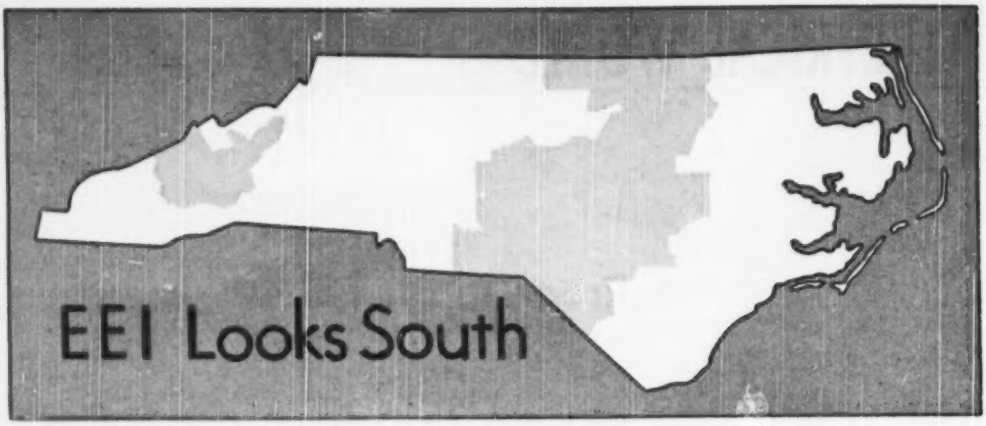
A Program for EEI

THE INDUSTRY EXECUTIVES and EEI officers have shown their willingness and desire to press for dynamic action. Both the incoming and the outgoing officers have their eyes on the dangers and opportunities in the future. In recognizing the size of the job ahead, the leadership has committed the industry and the institute to aggressive activities.

ELECTRICAL WORLD has selected significant points which were laid before the convention at Atlantic City. We have also attempted to interpret the philosophy of the progressive, new president, Louis V. Sutton. We commend the following items to the new EEI officers for inclusion in a program for the year ahead for the institute and member companies:

- **Maintain complete and harmonious cooperation among EEI, NAEC, ECAP and PIP.**
- **Redouble efforts in the field of community relations at the local level; aggressively promote ownership of the industry by its customers and employees.**
- **Recruit, train, and develop manpower in such a way as to assure the industry vigorous and competent management and leadership for the future.**
- **Initiate and support a co-ordinated industry research program. Employ all modern tools of management, such as industrial and methods engineering, standardization, work simplification, organization planning, market research, and incentives.**
- **Intensify cost-consciousness to the highest degree in design, construction, and especially operation.**
- **Sell more effectively the equipment, appliances, and services available to the electric customer.**
- **Plan boldly for future growth of the individual companies and the industry as a whole.**
- **Become an integral part of local and national planning groups and support in every way possible the institute's program for water resources development.**

If these points are accepted as a program by the incoming president of the EEI and his board of directors, we believe they will supply the basis for great progress. But programs are not enough. There must be appropriate action. The institute must actively promote this program through its committees and by every other means at its disposal. Such a program will consolidate and add to the great gains achieved during the past year. It deserves the support of the entire industry.



SHADED AREAS show service territory of Carolina Power & Light Co, of which Louis V. Sutton is president

. . . For Leadership

EDISON ELECTRIC INSTITUTE turned to the South this year for the first time in its history to select a new president. In Louis Valvelle Sutton it came up with an executive eminently qualified to cope with the most pressing problems facing the industry today. He qualifies especially on the very important grounds of experience and personality.

In these days when the executive guidance which once came from holding company management is rapidly disappearing, the industry must look to its operating companies for leadership. The operating companies' problems are the industry's problems. Few men in executive positions today can match Sutton's record of experience in handling operating problems.

After his graduation from the Virginia Polytechnic Institute, Sutton was selected by the General Electric Co for its two-year engineering test course. In 1912 he joined the staff of the company he now heads, Carolina Power & Light, as a junior engineer. He moved up through the ranks with Carolina—to statistician, assistant engineer, division manager, commercial manager, then assistant to the general manager.

During these 12 years he grounded himself in most of the broad field of operating procedure. He acquired a conviction that he still holds to firmly—that the engineer must familiarize himself with all phases of utility activities. And, more important, he must think intelligently about them.

In 1924 he left Carolina for a three-year stretch as assistant general manager of the Arkansas Central Power Co. Then, in 1927, he attained his first top administrative post as vice president and general manager of Mississippi Power & Light Co. He returned to the Piedmont area as president of Carolina in 1933.

Sutton's soft drawl and easy manner are deceptive. He is neither reticent nor ultra conservative. On his favorite topics of system operation, rates, merchandising—to name a few—he talks as readily and dynamically, perhaps, as any executive in the business. On matters with which he is less familiar, his philosophy is to pick the best man available and let him do the job. A classic example of this viewpoint is his recent selection of a publicity expert for his company. His selection was a veteran newspaperman—"because newspapermen speak their own language." And he was also "the best I could find in North Carolina."

But sincerity, above all other qualities, marks Sutton as a wise choice for EEI's man-of-the-year. There is no doubting either his sincerity or his determination when he says the industry's several service organizations and the institute must cooperate. It will be cooperation in the true sense of the word—not by elimination of any of the organizations. The industry has need of them all, Sutton contends. They need the support and assistance of all their present member companies, plus that of the nonmembers.

The programs of these organizations should be coordinated at both the top and local levels, he feels. This ties in with his strong sense of the urgency of good "grass roots" public, press, and employee relations. He sees doorbell ringing as only one way to meet the industry's broad problems. He believes that the companies which get their stories, and the industry's story, over to their customers, their employees, and their local papers will find others ringing doorbells for them.

But Sutton, like most fishermen, has patience. He sees that the institute, the recognized organization of the electrical industry, has many unforeseen problems of coordination and cooperation with the more recently formed service organizations. But he is optimistic about the prospects. The advances made, and in the making, he feels, far outweigh any early shortcomings and mistakes.

The Electrical Week

Edison Electric Institute's 18th annual convention drew the largest attendance in its history, 2,878 registrations. Next year, after four years at Atlantic City, EEI will go west to Denver (p 82) . . . David Lilienthal, former TVA head and more recently of AEC, has blasted the government's atomic monoply. He claims it is stifling the adaption of the atom to peaceful uses (p 83) . . . FPC has reopened hearings on the application of Virginia Electric & Power Co to develop a hydroelectric project at Roanoke Rapids. Sepa Administrator B. W. Creim fired the first blast at Vepco, whose application has already been recommended by an FPC examiner (p 85) . . . From FPC comes a handy list of utilities in the United States having generating capacity other than 60 cycles (p 86) . . . Hearings have been set by SEC for today (June 19) on four petitions demanding dissolution of American Power & Light Co (p 88) . . . And energy output just doesn't realize what month it is. Instead of dropping as usual, output for the week ended June 10 soared to 5,920,827,000 kwhr (p 89).

• • •

The American Meteorological Society has been told that Eastern United States has been getting warmer and warmer each year for the past 100 years. The increase in the annual average has been 3 to 4 degrees. If this trend continues another 1,000 years, air conditioning might provide an all-year load.

The American Institute of Electrical Engineers organized its first student branch in 1902. In 1925, when there were 82 branches, the first student branch convention was held at Philadelphia. Today there are 130 branches with over 20,000 members.

Write your nearest Bureau of Reclamation office or headquarters in Washington if you want a copy of the bureau's newest map of its activities. Power projects shown on the map will have an ultimate capacity of 7.6 million kw.

When it comes to cooperation, the advertising branch of the industry puts all the others to shame. Members of the Public Utilities Advertising Association send copies of their best ads to the association's advertising exchange where the best are reprinted in a monthly bulletin. They lend each other original art work. And the winning ads in PUAA's Better Copy Contest are reproduced in a book for all to see and copy.

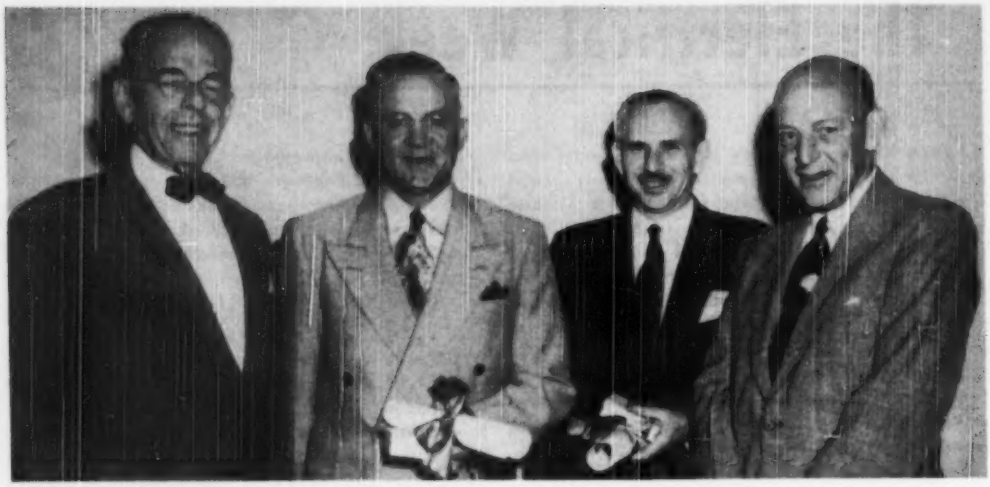
It is definitely unprofessional, said the National Society of Professional Engineers, at Boston, for a professional engineer, professionally employed, voluntarily to join a heterogeneous labor union, dominated by or obligated to, non-professional groups. Organizations of professional engineers for collective bargaining, in any form, are to be deplored, declared the NSPA.

New administrative powers of the chairmen of FPC and SEC have drawn criticism. The staff will have less independence on controversial issues, it's claimed, because it now must answer to the chairman. Under the old system, the staff was responsible to the entire commission and could find commissioners to support either side on really hot questions.

The Bureau of Reclamation believes that it is feasible (and probably someday will be necessary) to pipe water from the abundantly supplied Pacific Northwest to the arid Southwest.

Notes From The News

Southwestern Power Administration for the first time in its history is delivering hydroelectric power directly to three "preference customers." North Arkansas Rural Electric Co-operative at Salem, the city of West Plains, Mo., and Sho-Me Power Corp., Mo., are receiving power from SPA's Norfork Dam. SPA has served six co-ops in Texas with power from the Red River's Denison Dam, but delivery is made over lines of Texas Power & Light Co . . . Maine Public Service Co plans to build a 7,500-kw steam turbine plant at Caribou. Operation is scheduled for November, 1951, increasing generating capacity by 36.5% . . . For the second time in two weeks a boa constrictor has disrupted power service in the Canal Zone. The latest interruption occurred when a boa climbed a tower, burned out a 44-kv transmission line near Darien shutting off power on the Pacific side of the Canal Zone. The canal locks were out of power for two minutes and other installations for about 15 minutes . . . Pacific Power & Light Co has sold its 16-story building to New England Life Insurance Co for $3 million but will lease the building from the new owners . . . Sen Bourke B. Hickenlooper easily outdistanced Secretary Earl F. Wisdom of the Iowa Rural Electric Cooperative Association in the Iowa Republican senatorial primary.



CLAUDE L. MATTHEWS, left, president of the W. N. Matthews Corp, poses with a winner of the Claude L. Matthews Valor Award, A. L. Herriott, Texas Power & Light Co; Roman A. Browinski, Kentucky Utilities Co; and George E. Whitwell, chairman of the EEI Prize Awards Committee. Browinski was present to accept the award of the other medalist, John Fallis, Kentucky Utilities Co

EEI Holds 18th Annual Convention

Attendance Reaches Record 2,878; Sutton and Bryans Get Top Positions; Industry Heroes Honored; Union Electric Wins Annual Report Competition

ASHTON B. COLLINS, left, presents the first prize in the Reddy Kilowatt Annual Report Contest to R. E. Moody, executive vice president of Union Electric Co of Missouri. Honorable mention went to Arkansas P&L Co, Central Arizona L&P Co, Pennsylvania P&L Co

FOURTEEN SPEECHES, one evening of entertainment, and the presentation of awards for outstanding accomplishments —that was the official program of Edison Electric Institute's 18th annual convention.

The convention held June 5-7, was the largest in the history of the institute. Official registration was 2,878. It was also the last convention scheduled for Atlantic City until 1954. That year the resort city will celebrate its centennial and the industry the 75th anniversary of the invention of the incandescent lamp. Next year's convention will be held the first week in June at Denver. Other cities are tentative selections for the 1952 and 1953 meetings.

The board of directors elected Louis V. Sutton, president of Carolina Power & Light Co, as 1950-51 president of EEI. The vice presidency, which usually leads to the presidency a year later, went to Henry B. Bryans, president of Philadelphia Electric Co. Col. H. S. Bennion, vice-president and managing director, and Miss Mae B. Woods, secretary, were reelected. A slate of 15 directors was named for three-year terms, and two vacancies on the board were filled.

The speeches are abstracted in this issue. Following his opening address

LOUIS V. SUTTON, center, newly elected EEI president, is flanked on his right by predecessor E. L. Lindseth and on his left by the new vice president, Henry B. Bryans

Elmer L. Lindseth, EEI president, received a unanimous response from the convention floor to his request that those endorsing the Principles for Sound Water Resources Development rise. The principles had been endorsed several weeks before by the EEI directorate (EW, May 15, p 5), but Lindseth had outlined them more fully in his talk.

In general the principles call for industry-government cooperation for development of all needed projects, full encouragement of private enterprise by the government, and less competition from government in all phases of the industry.

General Electric Co, Westinghouse Electric Corp, and EEI were joint hosts at the supper and entertainment program. The Westinghouse Male Chorus gave a short concert. The presentation of the Charles A. Coffin Medal to the Washington Water Power Co was made at this time (EW, June 12, p 4).

Two heroes of the industry were honored at the last session when they received the Claude L. Matthews Valor Award for 1950. One of the medalists was John Fallis, boiler operator of Kentucky Utilities Co. The other was A. L. Herriott, local representative of the Texas Power & Light Co at Denton (EW, June 12, p 5).

Union Electric Co of Missouri received the Reddy Kilowatt Award for its 1949 annual report. It was judged to have set a "high standard that can be conformed to by all utilities, large or small."

The directors elected for three-year terms were A. M. Beebe, president, Rochester Gas & Electric Corp; C. P. Crane, president, Consolidated Gas, Electric Light & Power Co of Baltimore; E. W. Doebler, vice president, Long Island Lighting Co; M. F. Gill, president, Kansas Gas & Electric Co; N. B. Gussett, president, Iowa Power & Light Co; D. S. Kennedy, president, Oklahoma Gas & Electric Co; R. H. Knowlton, president, Connecticut Light & Power Co.

L. M. Klauber, board chairman, San Diego Gas & Electric Co; E. L. Lindseth, president, Cleveland Electric Illuminating Co; H. E. Meade, vice president, New Orleans Public Service; J. W. Parker, president, Detroit Edison Co; H. T. Pritchard, president, Indianapolis Power & Light Co; K. M. Robinson, president, Washington Water Power Co; L. V. Sutton, president, Carolina Power & Light Co; and H. C. Thuerk, president, New Jersey Power & Light Co.

Doebler, Klauber and Sutton were reelected after serving on the board to complete unexpired terms.

The directors named to fill vacancies were Stuart Cooper, president, Delaware Power & Light Co, who will serve until 1951, and J. G. Hotzclaw, president, Virginia Electric & Power Co, whose term will expire in 1952.

•

Railroad to Build Plants

The Alaska Railroad will build two generating plants, a 17,000-kw diesel-electric generating plant at Anchorage and a steam plant with three steam turbine generating units each with a capacity of 9,000 wk. The diesel plant will be operated jointly with the Chugach Electrical Association and will go into operation Oct 15. The steam plant is expected to go into operation in the spring of 1952. The CEA has received a $5,200,000 REA loan for the construction, which will enable it to provide additional power for Anchorage and the adjacent area. Part of the power will be used by the Alaska Railroad for its system.

Federal Atomic Monopoly Is Attacked by Lilienthal

David Lilienthal, former chairman of the Tennessee Valley Authority and the Atomic Energy Commission, has come out solidly against complete control of the atom and atomic information by the federal government. In a recent article in *Collier's* (June 17), Lilienthal declares that the government atomic monopoly is stifling the adaption of the atom to peaceful uses.

Lilienthal contends the government should turn over its atomic information and facilities to competitive private enterprise to speed the industrial development of the atom. This can be done, he believes, without disclosing atomic military secrets. Atomic energy is not merely a military weapon, he points out, although many people think of it in that way. He states:

"But this is as great an error as to think that the Chicago fire is a typical example of the use of fire, or that because electricity is used for electrocutions, electricity and electrocutions are synonymous. To put the development of electricity in the hands of a United States Electrocution Commission is about as sensible as to force our Atomic Energy Commission to become merely an Atomic Munitions Trust; and this is what we are now rapidly heading for."

•

Judge Rules City May Quit PUD, Form Own System

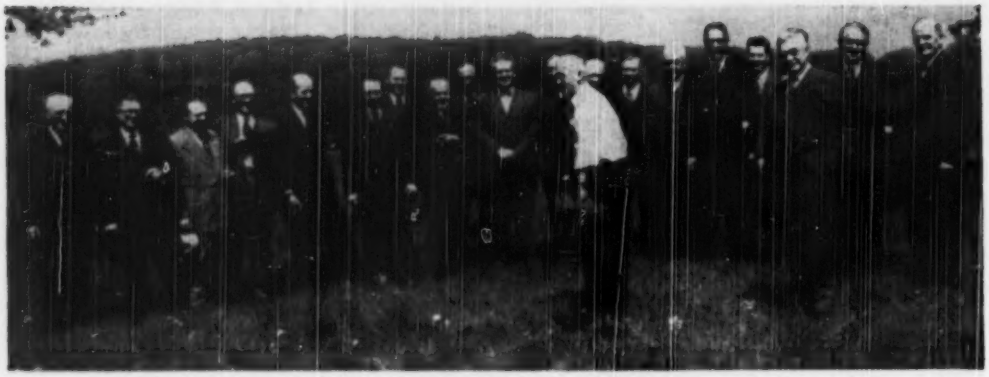
A restraining order obtained last year by the Pend Oreille County PUD to prevent the town of Newport, Wash., from acquiring its own electric distribution system has been set aside in superior court at Newport by Judge C. A. Pettijohn. A city may secede from a PUD and set up its own municipal power system, the judge ruled.

Clarence Dill, former United States senator, who served as attorney for the PUD, described the legal question involved as "very serious," possibly affecting 24 municipalities in other parts of the state, and said he would appeal to the State Supreme Court.

•

4 Linemen Electrocuted

Four linemen of Georgia Power & Light Co were electrocuted near Pearson, Ga., June 8 when a power line broke in a pouring rain storm and grounded into soggy ground where they were working. The men were erecting a power pole, which struck and broke the overhead line.



IT'S SHIRT SLEEVES for R. H. Knowlton, president of Connecticut Light & Power Co, when he breaks ground for company's central office building in Berlin, near Wilbur Cross Parkway. C. L. Campbell, chairman of the board, is at right front. Group in back are company officials

NLRB Widens Meaning of Union 'Membership'

The term union "membership" may be interpreted as covering persons who pay initiation fees and union dues without actually joining a union. At least that's one major point in the unanimous decision of the National Labor Relations Board upholding an unusual union security clause in a contract between Public Service Co of Colorado and Local B-1436, International Brotherhood of Electrical Workers, AFL.

The contract provided that certain employees at the utility's Boulder plant did not have to join the union but had to pay the amount of initiation fee ($3.50) and the equivalent of dues ($2 a month) "for the support of the bargaining unit."

One employee, Charles G. Smith, submitted these amounts to the union but insisted on being a member. The union not admit him, returning the initiation fee but holding the dues as "support" payments. Smith refused to make further payments and subsequently was dismissed by the company, on union demands, in accordance with the contract.

The contract was made under the Wagner Act just before the Taft-Hartley Act's closed shop ban went into effect. The Wagner Act allowed a company to make a contract with a union requiring union "membership" as a condition of employment. Smith filed unfair labor practice charges with NLRB, contending the law did not allow the labor contract to require anything other than membership in the union.

NLRB's trial examiner A. Bruce Hunt agreed with Smith. He held the Wagner Act prohibits discrimination in hiring or firing, except that a contract may require union membership as a condition of keeping a job. The "support money" provision in the Colorado Public Service contract had no relationship to "membership," the examiner found.

The five-man board overruled the trial examiner. He construed the term "membership" too strictly, NLRB said, citing the legislative intent of Congress when it passed the Wagner Act. Congress, it found, meant to include any lesser form of union security than actual membership.

•

8,500-Kw Unit Operating

First 8,500-kw unit at the Army's Narrows Dam in Arkansas went into operation late in May. A second unit will go on the line this month. Narrows, on the Little Missouri River, began producing several months ahead of schedule, according to the Corps of Engineers, which built the project. Output of the two units at Narrows is estimated at 25 million kwhr annually.

Dam Good Fishing

The waters behind Ross Dam have turned out to be a fisherman's paradise. The lake was closed to fishermen during the construction period, and the dam stopped the fish from going anywhere. Fabulous tales developed concerning the vast numbers of fish collecting in the lake. On the first day fishing was permitted everyone caught the limit. Now fishermen are flocking to the lake in cars, boats, and planes.

7 Arizona Co-ops Form State Distribution Group

Looking forward to the availability of Davis Dam power, due next year, seven Arizona cooperatives have formed a distribution cooperative. The combination was accomplished through the creation of the Grand Canyon State Electric Cooperative. Articles of incorporation have been filed with the Arizona Corporation Commission.

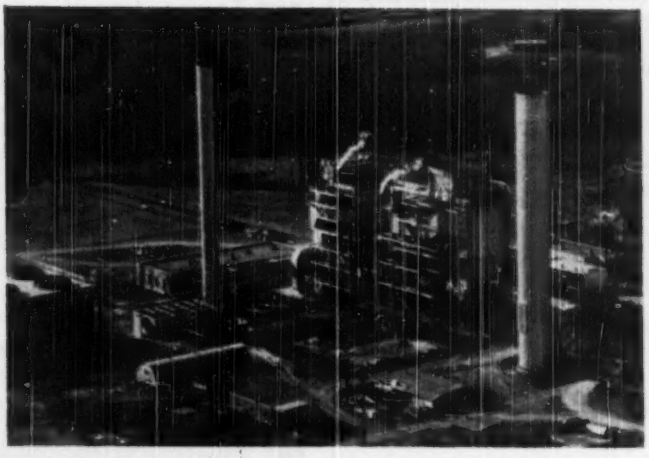
The new corporation will have no capital stock. Membership will be limited to REA-financed co-ops. The present members are these electric cooperatives: Navopache, Lakeside; Sulphur Springs Valley, Willcox; Graham County, Pima; Trico, Tucson; Verde, Cottonwood; Mohave, Kingman; and Duncan Valley, Duncan.

Purpose of the organization is to assure that the co-ops get the widest use of Colorado River power when it becomes available and to integrate the present generation facilities of the co-ops until that time.

•

To Install Radio System

The Seattle City Council has appropriated $118,000 for the installation of a microwave radio-communication system for the Lighting Department between Queen Anne Hill in Seattle and a new substation being built 17.5 miles north of the city. A cable will connect the substation and a tower to be built at the Queen Anne terminal. The radio system will consist of a two-way line-of-sight radio circuit and associated channelizing equipment to transmit 21 channels. They will include communication, telemetering, teletype, and load control circuits.



CONSTRUCTION advances at Rex Brown Station of Mississippi Power & Light Co, where a 66,000-kw unit is to go into operation early in 1951. Plant capacity is now 79,000 kw

Sepa Enters Roanoke Rapids Fight, Opposes FPC License for Vepco

THE INTERIOR DEPARTMENT'S Southeastern Power Administration last week was thrown into the thick of the long and bitter fight over development of the Roanoke Rapids.

Sepa Administrator B. W. Creim testified as hearings were reopened by the Federal Power Commission on the controversial project. An FPC examiner recommended March 20 that Virginia Electric & Power Co be licensed to develop the site over objections of the Interior Department.

Sepa will market power from Buggs Island, upstream from Roanoke Rapids. Creim said that water releases downstream for efficient operation of Roanoke Rapids would not be assured unless there was a contract between the company and the Secretary of Interior.

Reporting on Sepa estimates of power needs in the Roanoke Basin, Creim declared that contemplated federal projects at Buggs Island, Philpott, Gaston, and Smith Mountain will be insufficient to supply the requirements of federal power customers within the next ten and twenty years. Meanwhile, Creim disclosed three major power commitments are being negotiated by Sepa:

1. Old Dominion Rural Electric Cooperative in Virginia will get 35,000 kw from Buggs Island. Hearings will be resumed this week in Richmond, Va., on a proposed $14.3 million loan by the Rural Electrification Administration to finance Old Dominion.

2. National Advisory Committee for Aeronautics will have rapidly expanding power requirements for operation of wind tunnels at Langley Field, Va. Sepa is now negotiating for a contract calling for 70,000-kw on-peak and 150,000-kw off-peak power. Creim estimated possible cost of transmission lines to carry Buggs Island power to Langley at $15 million.

3. A group of eastern North Carolina co-ops is negotiating for purchase of 30,000 kw from federal projects in the Roanoke Basin.

•

Way Cleared for Co-op to Buy Utility Company

The way has been paved for the New Hampshire Electric Cooperative, Plymouth, to buy the White Mountain Power Co, Meredith. The State Public Service Commission has approved unanimously two of three petitions submitted by the two utilities last September.

One decision permits an amended service contract between the two organizations to become effective. As a result White Mountain will be able to secure a $200,000 REA loan, but the company will remain under PSC regulation.

A second decision amended a service contract to guarantee that White Mountain customers "will not be burdened" by the taking on of co-op customers.

The rejected petition would have allowed the co-op to construct service lines within 1,000 ft of existing lines of the utility.

REA plans to lend the co-op $2,712,000. Of this amount $1,350,000 will be used for the purchase of the outstanding stock and bonds of the electric utility company.

EXAMINING three of General Electric's latest lamp developments are Gilbert K. Hardacre, Public Service Co of Northern Illinois; Walter Sturrock, head of technical publicity for GE Lamp Department; and Lee E. Taylor, Detroit Edison Co. They attended the two-day lighting executives' conference held recently at Nela Park. Sturrock was conference co-chairman. The lamps are a 50-w GA lamp for ceiling clusters, a 100-w white lamp, and the R-40 white

UTILITIES IN THE UNITED STATES

Having Generating Capacity Other Than 60 Cycles

Federal Power Commission Report of April 1, 1950

State	Nearest Community	Utility	Plant	Type	Capacity Kw	Cycles
Ariz.	Tempe	Salt River Valley Water User's Association	Crosscut	Steam	22,500	25
				I C	10,000	25
				Hydro	5,100	25
"	Roosevelt	" " " " "	Horse Mesa	"	30,000	25
"	Mormon Flat	" " " " "	Mormon Flat	"	7,000	25
"	Roosevelt	" " " " "	Roosevelt	"	15,400	25
"	Mesa	" " " " "	So. Consolid.	"	1,600	25
"	"	" " " " "	Stewart Mt.	"	10,400	25
Calif.	Long Beach	Southern California Edison Co	Long Beach	Steam	69,000	50
Colo.	Canon City	Southern Colorado Power Co	Canon City	"	12,080	30
D. C.	Washington	Potomac Electric Power Co	Benning	"	50,000	25
Ill.	Chicago	Commonwealth Edison Co	Fisk	"	126,000	25
"	"	" "	Northwest	"	130,000	25
Iowa	Fraser	Ft. Dodge, Des Moines & So RR	Fraser	"	20,000	25
"	Keokuk	Union Electric Power Co	Keokuk	Hydro	85,600	25
"	Des Moines	Des Moines Railway Co	"	Steam	13,000	25
Kan.	Lowell	Empire District Electric Co	Lowell	Hydro	3,000	25
"	Riverton	" " " "	Riverton	Steam	42,500	25
Ky.	Louisville	Louisville Gas & Electric Co	Canal	"	12,000	25
La.	New Orleans	New Orleans Sewerage Water Bd	Pwr. Hse. #2	"	27,000	25
Me.	Milford	Bangor Hydroelectric Co.	Milford	Hydro	4,560	25
"	Stillwater	" " "	Stillwater	"	1,680	25
"	Rumford	Rumford Falls Power Co	Upper Station	"	24,000	40
"	"	" " " "	Island Station	"	3,775	40
Md.	Baltimore	Consolidated of Baltimore	Westport	Steam	122,500	25
"	"	" "	Pratt St.	"	20,000	25
Mass.	Florida	New England Power Co	Deerfield #5	Hydro	9,000	25
Mich.	Newaygo	Consumers Power Co	Croton	"	9,000	30
"	Grand Rapids	" " "	Wealthy St.	Steam	17,500	30
"	S. Ste. Marie	Michigan Northern Power Co	" "	Hydro	33,120	25
Minn.	Tomson	Minnesota Power & Light Co	Tomson	"	33,750	25
Mo.	St. Louis	Union Electric Co	Ashley St.	Steam	20,000	25
Nev.	Boulder City	U. S. Bureau of Reclamation	Hoover Dam	Hydro	247,500a	50
N. J.	Jersey City	Public Service Elec & Gas Co	Marion	Steam	18,000	25
N. Y.	Brooklyn	Consolidated Edison Co	Hudson-Gold	"	71,000	25
N. Y.	New York	" " "	East River	"	287,500	25
"	" "	" " "	Hell Gate	"	105,000	25
"	" "	" " "	Port Morris	"	60,000	25
"	" "	" " "	Waterside 1 & 2	"	162,200	25
"	" "	" " "	Long Island City	"	89,100	25
"	Albany	New York Power & Light Co	Riverside	"	7,500	40
"	Cohoes	" " " " "	School St.	Hydro	7,200	40
"	Niagara Falls	Niagara Falls Power Co	Adams	"	80,000	25
"	" "	" " " "	Schoellkopf	"	262,800	25
"	Massena	St. Lawrence River Power Co	Massena	"	7,750	25
"	Fulton	Central New York Power Corp	Granby	"	9,972	25
"	Newfane	Niagara Mohawk Power Corp	Burt	"	4,000	25
"	Waterport	" " " "	Waterport	"	2,400	25
"	Tonawanda	" " " "	Chas. R. Huntley #1	Steam	305,000	25
"	Oswego	" " " "	Bennetts Bridge	Hydro	11,200	25
"	Schenectady	General Electric Co	Schenectady	Steam	20,000	40
"	New York	New York City Transit System	Williamsburg	"	220,000	25
"	" "	" " " " "	59th Street	"	195,000	25
"	" "	" " " " "	74th Street	"	180,000	25
N. C.	Badin	Carolina Aluminum Co	Yadkin Falls	Hydro	13,300	36
"	"	" " "	Yadkin Narrows	"	56,200	36
Ohio	Toledo	Toledo Edison Co	Acme	Steam	50,000	25
"	"	" " "	Water St.	"	26,080	25
Pa.	Scranton	Lackawanna & Wym. Valley Power Co	Scranton	"	3,000	25
"	Hauto	Pennsylvania P & L Co	Hauto	"	30,000	25
"	Holtwood	" Wtr & Power Co	Holtwood	Hydro	87,000	25
"	Philadelphia	Philadelphia Electric Co	Schuylkill	Steam	65,000	25
"	Safe Harbor	Safe Harbor Water Power Corp	Safe Harbor	Hydro	60,000b	25
S. C.	Columbia	S. Carolina Electric & Gas Co	Columbia	"	1,750	40
"	Union	Union Manufacturing & Pwr Co	Neal Shoals	"	5,200	40
Tex.	Ft. Worth	Texas Electric Service Co	Handley	Steam	6,400	25
Wis.	Milwaukee	Wisconsin Electric Power Co	Commerce St	"	15,000	25

a Units interchangeable for either 50 or 60 cycle operation.
b Single phase.

BPA Turns to Larger Conductor for Its Lines

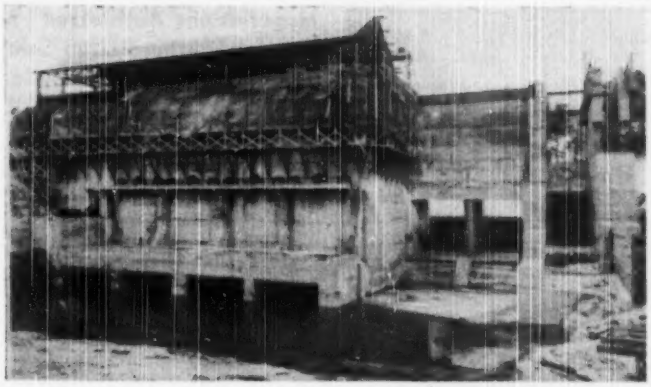
One of the first high-voltage transmission lines to use 1,272,000-cm ACSR "Pheasant" conductor was completed last month by Bonneville Power Administration. Comparative economic studies of the 800,000-cm, copper-equivalent "Pheasant" conductor and the 500,000-cm, copper-equivalent "Drake" conductor formerly used on 230-kv lines, indicate that increased costs of the former will be more than offset by savings from line losses. A typical 230-kv BPA transmission line using

"PHEASANT" conductor (lower) of 1.382-in. dia will replace "Drake" conductor of 1.108-in. dia on new BPA transmission line

"Pheasant" conductor will realize an overall saving of about 5% in annual cost.

Lower corona losses of the larger diameter conductor will permit transmission of power at considerably higher voltages than the 230-kv practical limitation of the 1.108-in. dia "Drake" conductor. Ultimate increase in current and voltage for this conductor will give two circuits about the same power transmitting capacity as three circuits using the smaller conductor. This will provide more flexibility in planning for future expansion of the Northwest power grid and more economical use of right-of-way in the limited passes through the Cascade Mountains to western Washington.

The first circuit from Grand Coulee Dam to Wenatchee, Wash., is 76 miles long. This will be extended to Olympia, a total distance of 240 miles. Present plans call for construction of a second circuit and installation of autotransformers at the terminals for operation at 287 kv. However, no date has been set for the beginning of this work.



NEW ENGLAND POWER CO's new 30,000-kw plant at Wilder, Vt., will put the Connecticut River harder at work. The old plant has a capacity of 5,000 kw. The new powerhouse is nearly complete. Two turbines are being erected and steel in the switchyard is going up

2 Utilities in Vermont Will Construct Plants

Two Vermont utilities are planning to expand their generating facilities. Central Vermont Public Service Corp has placed orders for a 5,000-kw gas turbine plant for Rutland and 2,600-kw in hydroelectric generating equipment to expand the Weybridge Plant on Otter Creek. Green Mountain Power Corp proposes to build a power plant near Waterbury, Vt.

Central Vermont expects the Rutland plant to be in service by July, 1951. The plant will be built at a cost of $1.2 million. It will have a capability of 6,000 kw. Included in the plant will be an oil storage tank with a capacity of 340,000 gallons. Bunker C fuel oil will be used enabling full capacity to be obtained from a cold start in about ten minutes. The plant will use about 500 gal of oil hourly.

Expansion of the Weybridge Plant, which is located about nine miles from Middlebury, will cost about $850,000. Work at the plant, which includes reconstruction of the dam in addition to installation of new generating equipment, will be completed before 1951. The head of the dam will be increased, and its storage capacity will be enlarged from 10 million to 26.5 million cu ft. Expansion of the plant is expected to reduce the company's dependence on outside sources of supply for its western area, which would otherwise call for very large outlays for transmission facilities.

Green Mountain Power Corp, a New England Electric System subsidiary, will build its plant on the Little River. Cost is estimated at $550,000. A dam and reservoir were built on the river in 1938, largely on lands deeded to the State of Vermont by the utility. Green Mountain reserved all water rights and power development privileges, subject only to use of the dam by the state for flood control.

•

Franchise Is Renewed

Arcadia has renewed the franchise of Iowa Public Service Co for 25 years.

Puget Sound P&L Seeks Reproduction Cost Price

Puget Sound Power & Light Co has proposed that the price of its properties the City of Seattle wants to buy be based on the cost of reproducing the facilities new, less depreciation.

Since the city and company engineers differ by $12,621,633 on the value of the company's distribution system in the Seattle competitive area, three councilmen have suggested that the city purchase only company property within city limits. This might reduce the price as much as 43%. Company officials, however, favor an equitable compromise between the city engineers' valuation of $23,767,324 and the company's estimate of $36,388,957.

In another development, Local 77 of the Electrical Workers' Union has asked the city council to accept collective bargaining which exists between the union and Puget Sound Power & Light as a condition in any purchase by the city of company's system. Since City Light comes under civil service, the union has no bargaining rights there.

The City of Renton, near Seattle, is considering purchase of Puget Sound P&L's distribution system in the Renton area in the event other properties of the utility in the area should be purchased by PUD's or the City of Seattle.

"DAWN OF NEW LIGHT," an 8x14-ft mural, has been unveiled in the capitol at Columbus, Ohio. The mural was the gift of the state's electric companies and is a memorial to Thomas A. Edison, who was born at Milan, Ohio, in 1847. Companies that contributed were Central Light & Power Co; Cincinnati Gas & Electric Co; Cleveland Electric Illuminating Co; Columbus & Southern Electric; Dayton Power & Light; Ohio Edison; Toledo Edison

YIELDS (%) — Operating Electric Utility Securities

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1950									
June 9	2.69	2.64	2.74	3.76	4.00	4.34	5.07	5.89	6.89
June 1	2.62	2.65	2.74	3.76	4.00	4.33	5.08	5.92	6.83
END OF QTR.									
1st 1950	2.59	2.61	2.71	3.78	4.01	4.36	5.02	5.83	6.67
4th 1949	2.59	2.61	2.72	3.85	4.06	4.46	5.37	6.15	7.01
3rd 1949	2.61	2.65	2.77	3.88	4.15	4.54	5.55	6.67	7.51
2nd 1949	2.69	2.75	2.88	3.98	4.26	4.66	5.94	6.96	8.14

Data: Reis & Chandler, Inc.

Hearing Scheduled for This Week on Petitions Asking End of AP&L

JUNE 19 has been set by the Securities and Exchange Commission for oral argument on four petitions demanding dissolution of American Power & Light Co or sale of its principal remaining subsidiary, Washington Water Power Co (EW, June 5, p 78).

However, some delay is possible. The Washington Public Service Commission, one of the petitioners, asked for a postponement, saying it was unable to prepare its case by that date.

The commission scheduled a separate hearing on the petitions instead of combining them with last week's arguments on American's plan to distribute to its stockholders the cash received from the recent sale of Pacific Power & Light Co. One of the petitioners, AP&L stockholder H. Lane Ogle, had urged such an enlargement of the scope of the distribution plan hearing.

SEC approval of the distribution seemed likely at the session last week, especially after it was backed by counsel for Ogle and the petitioning group headed by the firms of Goldman, Sachs & Co, New York, and Gerstley, Sunstein & Co, Philadelphia. Under the plan American would distribute $16,139,211.79 in cash, equal to $6.89 a share or slightly more than the proceeds of the Pacific P&L sale.

Ogle's petition asked the commission to enforce its eight-year-old dissolution order on American or determine whether American can continue to hold its stock of Washington Water Power, Washington Irrigation & Development Co, and other assets. He proposed a plan under which American would make a pro rata distribution of WWP's stock to AP&L stockholders, transfer securities of Portland Gas & Coke Co and Washington Irrigation & Development to WWP for sale by the latter, and distribute pro rata among its stockholders all its cash not required for tax and other claims.

Goldman, Sachs & Co and Gerstley, Sunstein & Co, on behalf of themselves and other stockholders, generally supported Ogle in their petitions.

Other petitions were filed by the Washington Public Service Commission and Idaho Public Utilities Commission asking immediate distribution or sale of the WWP stock.

PP&L to Split Stock

Pacific Power & Light Co has filed application with the Federal Power Commission to split its common stock 3½ to 1. The 500,000 no-par shares now outstanding would be replaced by 1,750,000 shares, also without par value. PP&L, a former subsidiary of American Power & Light Co, was sold to an investment syndicate last February.

Negotiations Authorized for Southern Utah Sale

Washington Gas & Electric Co's trustee has been authorized by the Securities and Exchange Commission to begin negotiations for the sale of its stock interest in Southern Utah Power Co, Cedar City, Utah.

The trustee must sell Washington G&E's 62,910 shares of no-par common stock of Southern Utah for no less than $350,000 plus adjustment payments equal to net income applicable to the stock from Sept 1, 1949. SEC also stipulated that all interested persons be given a "fair and equal opportunity" to make their offers.

•

Electric Power to Buy Properties of Subsidiary

Wisconsin Electric Power Co, Milwaukee, has received Securities and Exchange Commission authorization to purchase the electric properties of Wisconsin Natural Gas Co, formerly Wisconsin Gas & Electric Co, Racine, Wis., a subsidiary.

Wisconsin Electric will pay about $10.5 million in cash and surrender 150,000 shares of Wisconsin Gas's common stock at its $3,342,361 cost. To finance the acquisition and its own construction program Wisconsin Electric is selling $15 million of first mortgage bonds, due 1980, and 585,405 shares of $10 par common with rights at one for five.

•

AP&L Elects Directors

Four new directors have been added to the board of American Power & Light Co. W. N. Westerlund, L. C. Haines, R. H. Redsamen, and Emory Cantey have succeeded Elmer Erickson, W. R. Kenan, Jr, J. W. Frost, and C. E. Weed, who resigned.

Electric Utility Financing—June 3-10

Company	Description	Amount of Offering (000)	Offering Price	Yield at Price to Public
Bonds				
California Electric Power	2 7-8% 1980 new money	$2,000	101.75%	2.79%
Gulf States Utilities	2 3-4% 1980 new money	13,000	101.02	2.70
Wisconsin Electric Power*	2 3-4% 1980 new money and ref.	15,000	101.02	2. 0
Preferred				
Rockland Light & Power	50,000 sh 4.65% $100-par new money	5,163	$103.25	4.50
Common				
Wisconsin Electric Power	585,405 shares new money	10,245	17.50	

SCHEDULED

Bonds: Pacific Gas & Electric, 1976, new money, $80 million; Dallas Power & Light, 1980, new money, $24.5 million.

Common: Toledo Edison, 302,075 sh (400,000 sh by Toledo Edison, new money; 302,075 sh by Cities Service represents unsubscribed portion of May offering to stockholders), $7 million.

* On a consolidated basis.

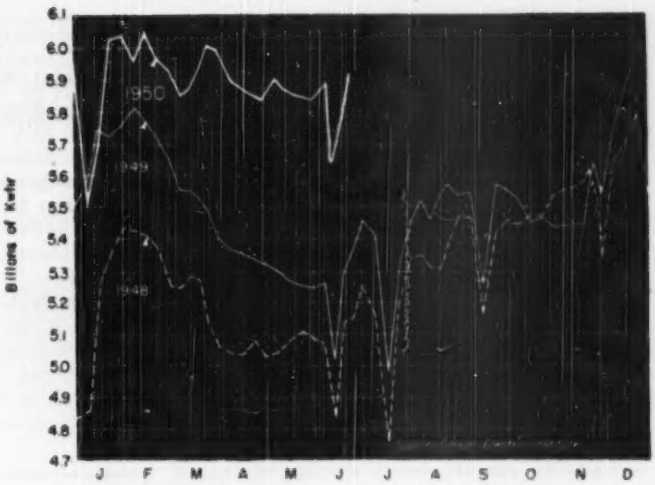
City Rescinds Contract for Reclamation Power

Roseville, the only city in California to contract for resale power from the Bureau of Reclamation, has rescinded the contract and is expected to sign soon with the Pacific Gas & Electric Co. The move was approved by the city council, 4 to 1.

Although the contract for Shasta Dam power was signed in 1945, no delivery has ever been made because of lack of transmission lines to the city. Instead, Roseville has been purchasing electricity from the PG&E at an open resale rate. A five-year PG&E contract at a lower rate is now being offered to the city.

Under construction at the present time is a 229-mile, 230-kv line from Shasta to the Central Valley Project's Tracy pumping plant which would pass within ten miles of Roseville. However, no money has been made available by Congress for the 10-mile connecting link.

Although Roseville is a city of only about 10,000, the dropping of the bureau contract was seen as a big victory by the PG&E in the California private vs. public power fight. The bureau contract with Roseville had been looked upon as the foot-in-the-door.



Output Week Ended June 10—5,920,827,000 Kwhr

Weekly Output, Millions Kwhr						Percent Change from Previous Year		
1950		1949		1948			June 10	June 3	May 27
June 10	5,921	June 11	5,300	June 12	5,132	New England	+18.1	+16.2	+15.0
June 3	5,632	June 4	5,018	June 5	4,845	Mid-Atlantic	+11.6	+12.1	+ 9.7
May 27	5,894	May 28	5,270	May 29	5,076	Central Industrial	+15.6	+14.5	+13.6
May 20	5,845	May 21	5,255	May 22	5,085	West Central	+ 9.3	+ 9.2	+10.2
May 13	5,864	May 14	5,257	May 15	5,109	Southeast	+12.1	+11.1	+12.3
May 6	5,872	May 7	5,284	May 8	5,087	South Central	+ 4.5	+ 8.4	+10.6
Apr 29	5,902	Apr 30	5,304	May 1	5,042	Rocky Mountain	+11.0	+14.8	+13.3
Apr 22	5,846	Apr 23	5,326	Apr 24	5,027	Pacific Coast	+ 7.9	+11.4	+10.9
Apr 15	5,863	Apr 16	5,343	Apr 17	5,087				
Apr 8	5,898	Apr 9	5,360	Apr 10	5,633	Total United States	+11.7	+12.2	+11.8

MEETINGS

Pennsylvania Electric Association
Electrical Equipment Committee, Abraham Lincoln Hotel, Reading, Pa., June 19-20.

American Society of Mechanical Engineers
Semi-annual Meeting, Hotel Statler, St. Louis, Mo., June 19-23; Fall meeting, Hotel Sheraton, Worcester, Mass., September 19-21.

American Society for Testing Materials
Annual Meeting with Exhibit of Testing Apparatus and Related Equipment, Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

CIGRE
International Conference on Large Electric Systems, Paris, France, June 29-July 8. I. W. Gross, secretary, American Gas & Electric Service Corp., 30 Church St., New York 8, N. Y.

World Power Conference
London, England, July 10-12. H. C. Forbes, secretary, Consolidated Edison Co., 4 Irving Place, New York 3, N. Y.

Instrument Society of America
National Conference and Exhibit, Buffalo Auditorium, Buffalo, N. Y., September 11-15.

Northwest Public Power Association
Convention, Portland Hotel, Portland, Ore., September 13-15.

Public Utilities Association
Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., September 22-23.

Canadian Electrical Manufacturers Association
Annual Meeting, General Brock Hotel, Niagara Falls, Ontario, Can., September 27-29.

★**National Television and Electrical Living Show**
Chicago Coliseum, Chicago, Ill., September 29-October 8.

★ Addition This Week.

CHANGES IN CAPACITY REPORTED TO FEDERAL POWER COMMISSION

PLANT ADDITIONS DURING APRIL

Utility	Plant	Fuel	Capacity (Kw)
New York State Electric & Gas Co	Greenidge	S	40,000
City Sewage Treatment Department	Columbus, Ohio	IC	1,000
Vevay Electric Light & Water Department	Vevay, Ind.	IC	750
Rensselaer Water & Light Department	Rensselaer, Ind.	IC	1,980
Waterloo Municipal Light Plant	Waterloo, Ill.	IC	1,118
Newton Electric Light & Water Works	Newton, Ill.	IC	560
Detroit (Mich.) Edison Co	Trenton Channel	S	100,000
Detroit (Mich.) Edison Co	Trenton Channel	S	100,000*
Corn Belt Power Cooperative	Humboldt, Iowa	S	7,500
Forest City Light Department	Forest City, Iowa	IC	700
Lebanon Light & Water Plant	Lebanon, Mo.	IC	1,000
Ord Electric & Water Department	Ord, Neb.	IC	1,915
Iola Electric Light Department	Iola, Kan.	S	3,000
Washington Municipal Light Plant	Washington, Kan.	IC	360
Lamed Electric Light Department	Lamed, Kan.	S	3,000
Kentucky Utilities Co	Green River	S	30,000
Mississippi Power & Light Co	Port Gibson	IC	100
U. S. District Engineers	Norfork, Ark.	H	35,000
Arkansas Power & Light Co	Lake Catherine	S	44,000
New Orleans Public Service Co	Industrial Canal	S	44,000
Dallas (Texas) Power & Light Co	Mountain Creek	S	12,500
Dallas (Texas) Power & Light Co	Mountain Creek	S	12,500*
Bureau of Reclamation	Coulee Dam, Wash.	H	108,000
Bureau of Reclamation	Kerwick, Calif.	H	25,000
Pacific Gas & Electric Co	Rock Creek (Calif.)	H	113,400

PLANT RETIREMENTS DURING APRIL

Newton Electric Light & Water Works	Newton, Ill.	S	1,000
Iowa Power & Light Co	Red Oak No. 1	S	360
Madora Township Light Plant	Madora, N.D.	IC	106
Texas Power & Light Co	Palestine	S	800
Texas Power & Light Co	Palestine	IC	350
Texas Power & Light Co	Lufkin	S	1,010*
Texas Power & Light Co	Brownwood No. 2	IC	975

*March additions and retirements

H — Hydro, IC — Internal Combustion, S — Steam
United States Capacity as of May 1 — Steam, 45,571,596 kw; Internal Combustion, 1,831,518 kw; Hydro, 17,159,228 kw; Total, 64,562,342 kw.

WASHINGTON COMMENT

RONALD D. ROSS

IT'S BEEN only six months since President Truman in his "State of the Union" message formally told Congress that he considered federal power for New England fair game for his Fair Deal. Despite the strength and logic of the industry's attack on this proposal, there is little doubt in Washington that it is gaining serious proportions.

Not all the moves are out in the open where their connection with the proposed federal power invasion of New England is obvious. The announced administration program for New England shapes up this way. Congress is asked to approve a White House-named study commission to report on natural resource development in New England and New York. It's clear that the chief resource would be water power. Such a commission, unquestionably, would become quite excited about the 3 million kw of potential hydro which FPC said last year "seem to merit further investigation and detailed study." St. Lawrence would be urged as a major link in a new federal power system which the study group would find promised "cheap hydro" to New England.

This session of Congress turned down an effort to create the commission as a part of the flood control-navigation projects authorization bill. Instead, the measure calls for studies of New England rivers by the Army Corps of Engineers. House and Senate Democrats from New York and New England are still working on the commission scheme, however, and it will be sought more vigorously next year.

Federal power proponents won't have to wait on this yet-unauthorized commission. President Truman's Water Resources Policy Commission reports by Dec 1. It certainly will deplore the absence of federal hydro development in New England and urge some action. This will provide more fuel for the fire the administration is seeking to build under Congress.

More important is a quiet operation within the region. Fourteen REA-financed co-ops last month formed the Northeast Electric Cooperative Association. The purpose: Organization of one or more generating and transmission federations to construct steam generating plants.

This is more than the familiar super co-op pattern. These co-ops—along with the municipal systems represented at the May organizing meeting—would be preference customers for any federal hydro in the area. More significantly, federally financed steam plants in New England would bulk large in any plans for a federal power empire in the area.

If New Englanders have any doubts about REA's role in the federal power invasion of their territory, they can get first-hand reports from Southwestern company officials. Congress refused to appropriate funds for Southwestern Power Administration steam plants; so REA made record-shattering steam plant loans to super co-ops. The co-ops are leasing the facilities to SPA. It's too early to predict a similar deal in New England, but the stage is being set.

Several REA officials journeyed from Washington to the co-op meeting in Burlington, Vt., and the principal speaker at the meeting also flew up from Washington. He was Walton Seymour, chief of Interior's Division of Power. Seymour, one of the real leaders in the federal power movement, proudly fostered Interior's new Southeastern Power Administration. He's a logical candidate to create a Northeastern Power Administration.

Again, it's too early to be organizing a new agency to market the output of hydro plants which have not even been authorized. But it's not too early to look realistically at the aims, as well as strategy, of the Fair Deal's New England program.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Water cooling would be more welcome for heavily loaded motors except for the loss or leakage of the water.

Series street lamps are fed "constant" current that may actually not vary more than a fraction of a percent; multiple lamps may have their voltage vary five percent or more.

Condensing water circulated from and back to the ocean by one large utility totals 2½ times as many gallons of fresh water as are consumed by the whole metropolitan population.

Primary networks capitalize on load diversities to improve voltage regulation and loss performance, but do present double the exposure and risk of outage of a comparable radial system.

Deformation during creep of metals at high temperatures has been found to be recovered, even at high temperatures, when the stress is removed.

Scarcity of frequencies for mobile radio will put increasing premium on adoption of interference-free apparatus and the supercession of old equipment (5 to 7 years is obsolescent) prone to cause and respond to adjacent-channel interference.

Ball-bearing would probably be used more often for heavy-duty high-speed motors if the belief that, "when they fail they fail without warning" could be dispelled.

Low efficiency of a transformer means that permissible duration of the economic peak of a particular percentage of nameplate rating will be much shortened.

Call For Action

More training and remuneration for executive manpower, increased industry research, and implementation of Institute water resources policy held vital for the future

BY EVERY STANDARD, the electric light and power industry today is a greater asset to our nation than ever before. It is more productive than ever before. It is stronger in every component part; in the size and efficiency of its power plants and other facilities, the skills of its manpower, the solidarity of its aggregate financial structure, and the nationwide adequacy and dependability of the vital public service it supplies.

By the end of this year the electric utilities of our country will be serving about 45,000,000 customers, including 5,500,000 farms.

Electric service will then be available to 97% of the nation's farms, and to 98% of all occupied homes, urban and rural.

Thus the electrification of our nation, in the sense of universal availability of electric service, is nearly complete. And despite the invasion of the electric utility industry by the Federal government, the electric companies are directly serving 80% of the nation's electric customers and are supplying 85% of the power which utility customers consume.

A Look at the Future . . . Nobody in our business thinks that the electrification of the nation, in the sense of supplying all the electric service that an increasing population and an expanding economy will require, is completed—or ever will be completed.

Let's take a look at the future. If our industry should grow in the next 20 years at the same rate it has grown during the past 20 years—half of which were depression years—by 1970 its power plant capacity will have tripled to over 200 million kw, compared with today's 64 million kw; annual revenue of $11¼ billion will be 2½ times today's $4½ billion; and property and plant of $65 billion will be three times today's $22 billion.

ELMER L. LINDSETH
President
Cleveland Electric Illuminating Co

EEI's retiring president, Elmer L. Lindseth, won scholarships to Case Institute of Technology and Miami University and earned his master's degree from Yale on a teaching fellowship. He joined CEI in 1926 as a junior tester, spent 10 years as production engineer devising improved operating methods and machinery, then rose through various executive positions to the presidency in 1945. Mr. Lindseth also is a member of the executive committee of the Association of Edison Illuminating Companies and is active in many civic groups.

These figures are merely the result of the projection of the past 20 years' trend. If these figures come true—and I believe they will—it will mean adding more than 130 million kw of capacity with collateral additions to transmission and distribution systems, and raising over $30 billion or more of capital. That is, our industry will require an additional investment over the next 20 years equal to the total investment today in the nation's iron and steel, automotive, and petroleum and coal industries.

The Job Ahead . . . Let's ask ourselves, do we realize the true size and complexity of the job ahead of us? Are we gearing our thinking and planning to the challenge of the oncoming years?

First, in common with all other industry, you and I know we cannot progress—or even survive—except by constantly improving efficiency, economy and productivity in ever phase of our business, in design and construction, and especially in operation.

The Institute has had under consideration for several years the adoption of a co-ordinated industry research program. I urge everyone in the industry to interest himself in initiating and supporting this program.

We certainly must intensify cost consciousness to the highest degree in every phase of our business—in design, construction and, I repeat especially in operation—and throughout our personnel at every level.

We must continue to improve our sales techniques and public relations.

Need Trained Executives . . . To accomplish these objectives will require the very best, trained executive manpower. The more our business grows, the more it will require skilled executive talent. In fact, I believe the prime requisite for the success of a 20-year program of the great dimensions in prospect is adequate trained executive manpower.

Three years ago 12% of our industry's top executives were 65 or over; today 11%. Then 39% were 60 or over; today 26%. Then 16% were under 50; today 17%.

Even so, the average age of top executives in our industry today is higher than that of industry in general. So the problem our industry faced three years ago of finding suit-

able successors for top executives on retirement is virtually the same today.

The figures cited on average ages comprise the five top executives in each of 42 operating companies, each with annual revenues in excess of $25 million. It is not unlikely that within the next five years 70 of these 210 executives, or one-third, will be retired from business.

Again let us ask ourselves:—Are we ready with replacements for them—and, in addition, the top executives who concurrently will be retiring from several hundred other electric companies?

Three years ago I also reported the results of a survey made to find out how students at institutions of higher learning regarded a career in our industry.

The survey revealed that students with top executive potential had virtually no interest in going to work for an electric utility. This demonstrated that if our industry were to recruit truly outstanding young men, it had to make itself attractive to them.

Now, three years later, how do we stand? A new survey shows that student attitude has improved slightly, at least in the *number* of young men interested in our business. But this may be because there are fewer job opportunities for graduates today than in 1947.

This year's survey also definitely reflects the security complex which afflicts our nation. Among the students now attracted to our industry, it is security of employment that appeals to 78%, as against 54% in 1947.

At the same time, the growth and opportunity for advancement in our industry is attractive to only 42% today, compared with 70% three years age.

It is also significant that a survey of the June 1950 graduating class of the Harvard Graduate School of Business Administration disclosed that not one of 500 men in the class had any desire or intention of entering the electric utility business.

All of this shows we have a big job ahead of us—in the recruitment, selection, training, and development of manpower—to assure our companies competent executive leadership for the future.

If we are to have adequate top executive manpower, we must provide financial incentives that will attract and hold the highest potential of business leadership.

We learned from a survey three years ago that the top executive salaries in our industry were much too low to be competitive with those paid by other businesses and industries.

I am sorry to report there has been little change.

The median salaries of the five top executives in 42 companies are almost precisely the same as they were in 1947.

Fight Propaganda . . . Despite two world wars, the world's greatest depression, and the fanatical campaign by socialist-minded people in and out of government to destroy the electric light and power companies of the nation, our business is one of free America's greatest assets and best examples of freedom of enterprise at work in the public interest.

In consequence, except for some areas in which the Federal government dominates the situation, there is plenty of power, and at low cost.

It is sheer propaganda when the proponents of federalized, socialized power try to justify government invasion of the electric business by representing that there is a power shortage.

Strange as it may seem, some people may be—in fact, are being—misled by such propaganda. Therefore, it is our business to tell them the facts!

As I have gone about my chores during the past year, I have talked with scores of leaders in our business, and with hundreds of leaders in other businesses and industries, and in education, labor, government and other fields.

From these conversations, I am convinced that there is developing in our nation an increasing awareness of the menace that creeping, encroaching socialism has developed into.

But we cannot afford to become complacent! The cold war against freedom of enterprise here in America is being waged without letup. It is our prime obligation to hold the line against further socialization of the electric light and power business—and with it, all business!

Our Water Resources Policy . . . The Edison Electric Institute recently received an inquiry from the President's Water Resources Policy Commission, in answer to which the Institute proposed a set of principles for water resources development in the legitimate interests of the public utility industry and the best interests of the public as a whole.

The institute has sent to the commission a statement of principles, duly approved by the institute's board of directors, and also has sent copies to all member companies.

The statement begins:

"The Edison Electric Institute and its member companies stand for the sound economic conservation, development and utilization of the water resources of the Nation in the public interest.

"They recognize that stream control aimed at flood prevention, water supply, reclamation and navigation may involve functions of the Federal Government and that often in connection therewith electric power development is economically feasible and should be made.

"The American free enterprise system has consistently and continuously demonstrated its ability to develop hydro and steam power to furnish an enviable per capita use of power.

"On the basis of its continuing record of achievement in supplying adequate power in peace and through two world wars, that enterprise system should be adhered to and fostered in connection with the development of water resources.

"It should be the policy of the Federal Government to cooperate with private capital and to encourage the participation to the greatest possible extent in the power features of water resources projects. . . .

The principles are a vital contribution to America's economic and political philosophy. The implementation of these principles by Congressional action will benefit the people of this great nation for generations to come.

As president of the Edison Electric Institute, I urge representatives of the electric light and power companies of America to do their utmost to have these principles written in the law of the land.

The Electric Utility of Tomorrow

Larger, more efficient power companies, serving the growing load of a free nation, and an end to government competition, are foreseen

THIS IS the pattern of the future as I see it:

1. A strong, prosperous and free country—a true land of opportunity—in which to live and work.

2. A vast additional market for electricity.

3. Improving efficencies, so that electric power will be a greater bargain than it is now.

4. Stronger, larger, better organized electric companies.

5. End of the competition from subsidized Federal power enterprises and a clear road ahead to develop and operate the electric utility business in the public interest for the advancement of our nation. It is a good prospect; it is ours if we will make the effort to realize it.

I am confident that America will remain free. But it will be an America differing from the one we used to know. We cannot, if we would, turn back the clock to conditions of another day. New ideas, new wants, new aspirations, and new standards have brought inevitable changes.

World leadership has brought a heavy burden of responsibility to this country. We cannot lay it down if we would. We have yet to learn how to carry it—but learn we must, though the education will be difficult, blundering and expensive.

The America of tomorrow will run on electricity. Right now this nation is using more than 300 billion kwhr a year. But just to light American homes, businesses and factories adequately would require at least 100 billion kilowatt-hours a year more than we now use for the purpose. Air conditioning; electric cooking; food freezers; clothes dryers; television; electric blankets; water heaters; soil heating; the many, many other present fields for electricity that have hardly begun to be exploited, all add up to an undeveloped market twice as large as present sales to ultimate consumers.

Distribution systems of the future probably will look much as they do today. But they will be called upon to handle much larger amounts of electricity than at present. Primary distribution systems of 22,000 volts will be standard practice, with direct conversion to service voltages.

Tomorrow's transmission system will be built in accordance with a carefully worked out system plan for each company and as an integral part of the system in the general area and possibly at higher voltages.

Today, construction costs are several times as high as they were 25 years ago. Yet so great has been the skill of designers and manufacturers, and so important the effect of size on unit cost that, even at the inflated prices of today, the industry is able to build new power plants for relatively little more per kilowatt than it spent for the much less efficient stations of 25 years ago.

These have been tremendous advances, but even greater ones may lie ahead, in higher steam temperatures and pressures, in the gas turbine, and in atomic energy.

The electric company of the future will be much larger than it is today. The load is growing in every locality. Some companies have more than doubled their plant accounts since the war, and their expansion programs will continue through the foreseeable future.

Departmentalization, delegation of authority and responsibility, selection and training of first-class new blood—all these things will become increasingly important as the years go by.

The federal ownership of electric utilities is the very cornerstone of the subversive "isms" that threaten to overwhelm us. The ruinous conflict between the federal government and the electric companies must be brought to an end on a sound American basis. United, we must put our full energies to this task,—complacency and timidity will be fatal. I have every confidence that our industry, which has accomplished so much in the past, will be successful in meeting this problem of survival with which it is faced.

CURTIS ERNEST CALDER
Chairman of the Board
Electric Bond and Share Co
Ebasco Services, Inc

Head of what was once one of the nation's largest utility holding companies, Curtis E. Calder also is a vice-president of the National Association of Manufacturers and in 1943 was director general of the War Production Board. He has served as president of Texas Power & Light Co, Texas Electric Service Co, Dallas Power & Light Co, and American & Foreign Power Co. He is a director of National Power & Light Co and 10 other companies. From 1939 to 1941 he was public governor of the New York Stock Exchange.

Mr. Calder was unable to attend the meeting. His paper was read by C. N. Phillips, Ebasco Services, Inc.

Developing Tomorrow's Leadership

Developing executive talent is industry's most challenging problem today because we have so far given it the least attention

I FIRMLY BELIEVE that all of us in industry have a paramount obligation today to address ourselves to the problem of developing the management of tomorrow.

Many serious students of the problem are saying that tomorrow's managers have not had the opportunity to learn their jobs and that there is today a shortage of men trained to take over the responsibilities of top level executives. Their criticism is not necessarily an indictment of industry's failure in the past.

It is literally true of many of today's managers that they know how to run their business because they made them what they are today.

Generally speaking, there are two ways in which a man who would otherwise gain only specialized experience can be given the opportunity to acquire the broader background required of a manager. One of these is by regular rotation on jobs in different phases of the operation. This method has been successfully employed by a number of companies, but in carrying it out, I think there is one danger which should be guarded against. Along with the rotational training, the candidate must acquire the ability to delegate authority so that when he winds up in the managerial job he will resist the temptation to feel that he knows each of the specialties better than the men under him.

A second method of training is through the creation of additional assistant managerial jobs. It may seem a luxury to create additional jobs, but wherever this method can be made a part of the organization chart without becoming too serious a burden, it is bound to prove a worthwhile investment in the future.

In assigning a man to the "assistant to" position, where he is assistant to the president of the company or assistant to some division manager on down the line, I think it is important to emphasize it is an over-all job.

RALPH J. CORDINER
Executive Vice President and Director
General Electric Co

Ralph J. Cordiner has been connected with the electrical industry since he financed his studies at Whitman College, Walla Walla, Wash., by selling electric appliances for Pacific Power & Light Co. In 1923 he joined Edison General Electric Appliance Co, whose heating device section later was consolidated with GE's appliance and merchandise department. Mr. Cordiner became manager of that department in 1938 and a GE vice president in 1945. He also has been president of Schick, Inc, and vice-chairman of WPB.

The most important qualifications he must have are these:

1. He must know how to select people and organize their efforts by defining responsibility, authority and accountability.
2. He must be understanding of human problems.
3. Above all, he must be sensitive to social, economic and political trends.

The first step in assuring that your company is making adequate provision for executive development is in the analysis of your own organization, both present and future. Writing job descriptions of the present managerial positions will help determine what qualifications are needed to fill them and pave the way for the second step which is the selection of replacement candidates.

Development of an adequate organization for tomorrow—just as the baking of a cake—comes in two stages. Baking a cake requires first a recipe. Building an organization requires an organization chart. But neither the chart nor the recipe is a guarantee of success. Some people dislike organization charts because they think of them as nothing but paper-work. And it is true that a recipe or an organization chart is nothing but a piece of paper until you put it to work. So it is the second stage which is the more important one, and that is in the selection and training of the people who translate an organization chart into a living thing.

The executive development program will not receive the emphasis it needs, nor will it go far enough, unless it is made the No. 1 and most important job of the chief executive himself. By this I do not of course mean that the president or chairman of the board, as the case may be, would personally supervise the training program. But he must make it his concern first to see that his company has a program. Then he should make each officer responsible for reviewing it with him.

The well-rounded background and broad perspective which can be developed by rotation is more than ever important today when it is so difficult to predict which area of operations will present the most pressing problems to tomorrow's chief executive.

Is Free Enterprise Worth Saving?

American business has the task of re-establishing public confidence in the integrity, capacity and ability of American private enterprise

"IS THE American System of Free Enterprise Worth Saving?" The answer to this question hinges upon the answers we would make to some other inquiries. For example, what is the American system of free enterprise? What has it accomplished for us? Granting that we were to discard it, what system would we set up in its place?

The answer to the first question is in the principles subscribed to by the founders of our country, who believed that among these is the right to hold property and to be secure in the possession of property.

What happens when this right is denied or abridged? Well, suppose we look at Great Britain, which in 1945 gave the nod to leaders who believe in the substitution of economic planning and controls for private initiative. In a recent editorial in *The Saturday Evening Post*, William Henry Chamberlain wrote: "The missing dynamo in the British industrial machine is the absence of initiative to work hard and effectively. Because of the back-breaking taxes and the thousand restrictions on private initiative, no one has much inducement to rise above the low average standard of living assured by the government."

And what is happening in our own country? The politicians tell us that things are booming, and so they appear to be. But there are disturbing overtones in the picture. The tax burden, intolerable as it is; federal subsidies; government competition in various fields of business; our top heavy governmental personnel — all are symptoms of the political disease of totalitarianism, or state-ism.

However, the purpose of American government, as set forth in the Declaration of Independence, is to secure the rights of the individual—that and nothing more. The government, as such, has no rights. It derives its "just powers from the consent of the governed."

JAMES E. McCARTHY
Dean, College of Commerce
University of Notre Dame

Dean James E. McCarthy of Notre Dame's College of Commerce is on the advisory board of the American Enterprise Association, Inc, and a director of the Advertising Council. In 1939 he published "The Physical Assets of the State of Indiana and the Earnings and Distribution of Income of Indiana Corporations." Dean McCarthy also belongs to the U. S. Chamber of Commerce's committee on advertising, the Bureau of Economic Research at Notre Dame, the American Marketing Association, and the National Association of Cost Accountants.

But government has been stepping out of bounds. To state the case most simply, government has been taking the attitude that it is the cause and not the effect of man's individual rights. Gradually, our government has become coercive rather than protective. And although thus far we are not completely under the thumb of a cynical governmental absolutism, we know we cannot escape much longer.

Criticism of American free enterprise is carefully organized and apparently well financed. The enemies of the American system are for a socialized state in which the citizen will not be a citizen at all, but from the cradle to the grave a subject of the state. And these forces are meeting with some success. For example, here is how the public mind has changed. There was a time when "profit" was a legitimate return on an investment. But today "profit" has come to have a sinister reputation, and those who take profits are automatically princes of privilege who would reduce all lesser Americans to a helpless and hopeless serfdom.

We, however, have arrived at the stage where government writes the practices and dictates the policies by which industry must conduct itself if it is to function at all. With each successive piece of legislation that places new and unwarranted restrictions upon industry, it advances another step toward its goal. It will not be easy to turn the tide so that both government and business function smoothly and properly in their respective spheres. But it can be done.

We all must be agreed that a harmony of national interests can be achieved only through espousal of an economic pattern that guarantees the widest possible diffusion of benefits to all our people. Labor cannot prosper at the expense of capital; capital cannot long prosper at the expense of labor. The two are not natural enemies, but natural allies.

The job of the American business leader is to re-establish the public confidence in the integrity, capacity, and ability of American private enterprise. In this way, the speaker believes we can defeat the highly organized, highly financed economic illiterarcy in our country when we, as good propagandists, begin making positive declarations of business policy.

Who Is Getting Hurt?

The speaker refers to his address at the 1931 Atlantic City Convention on the attack from the public ownership group

SOCIALISM has made decided headway in replacing American individualism in the past 19 years. The key to its progress is in the designed promotion of an ever-increasing dependence of the citizen upon government. While I do not charge that there was a plot to entrap the citizen by increasing dependence upon government, if there has been such a plot and if it had been cleverly, gradually and stealthily executed over the past 18 years, a more masterful job could scarcely have been imagined.

The first two steps in the program for domesticating the citizen and creating dependence on the government are: First, destruction of faith in the old order, largely accomplished by exaggerating the depression as the final demonstration of failure of the old order; and second, the stampede of fear, cleverly disguised as a forward march toward a New Deal, during which the heads of the American people were turned, their once clear vision blurred and they were induced to take the sharp turn to the left which eventually led them directly back toward that regime of dependence upon omnipotent government from which the men of 1776 and 1787 hoped they had delivered us forever.

Among the other important mileposts in "the retreat from freedom", are: (1) The extension of federal control over banking, money and credit; (2) The use of the federal income tax to redistribute wealth and to level income; (3) Use of farm subsidies to bring the farm under control and to establish an attitude of dependence upon the part of the farmer; (4) The deal with union labor leaders exchanging a grant to them of government power over their members in exchange for their political support; and (5) The vast expansion of powers over prices, wages, and the economy as a whole which came with World War II. Many fields of business have been invaded by Government. I recall my prophecy of 1931 that the electric industry was at that time "only for the moment in the first line of defense." We are still there in the first line of defense but we have been joined by many others, who along with us, are being taxed to support government intervention which threatens first to ruin them, and then take them over.

WILLIAM C. MULLENDORE
President
Southern California Edison Co

Known as a writer and speaker on economic and governmental subjects, William C. Mullendore joined Southern California Edison as special counsel in 1925, became president in 1945. He has been president of the Pacific Coast Electrical Assoc and a vice president of the U. S. Chamber of Commerce. Mr Mullendore was counsel and liquidator of the U. S. Food Administration after World War I, special representative of the American Relief Administration in London and Berlin, and assistant to Secretary of Commerce Herbert Hoover.

Everyone is getting hurt, because every citizen is being deprived of his or her most vital source of strength, —his self-reliance. Everyone is becoming more and more dependent upon Government for his job, for his earnings, for his home, for direction and control in the management of farms and businesses and the prices he is to get for his products and services; for his care in old age, sickness and in unemployment. Private savings are being rapidly confiscated and stealthily taken through inflation, and the independence which the self-reliant older people thus built for themselves is being destroyed. Everyone is losing because he is being deprived of the God-given right to manage his own life.

What can we do about it? In facing this question we are first of all met with the baffling and discouraging fact that the American people are unaware of their danger. They, the people, are impressed with the amount of money they have to spend, with the apparent prosperity, and with the "highest standard of living they have ever enjoyed." Political, educational, religious and business leaders alike are failing in their duty to enlighten the people on the falsity of their concept of this as a period of prosperity and progress.

What can we do? We can tell the people—our stockholders, our customers, our employees—the truth. We can tell them the facts in response to their inquiry "How is business?" That truth is that this is a phony prosperity, financed by legal counterfeiting, and by the confiscation of the savings of thrifty people; that we are in the most dangerous and unsound boom in our history, and that the longer it continues the more dangerous it becomes and the worse will be the reaction to the excesses now occurring under the guidance of government economists and planners.

Where Are We Going?

Today, conditions at home and abroad emphasize what we must do to preserve a society based on free enterprise

NO WONDER the world has become such a frightening place. How can people be expected to find order in a set of circumstances quite beyond comprehension and which, in truth, also appear to be beyond the mental powers of our ablest diplomats and statesmen?

Apparently, we are unable to adjust ourselves to this Barnum and Bailey world because it is not coinciding with our wishes. We prefer to discuss situations which do not exist rather than face existing challenges which we must conquer before we can survive under an acceptable form of government. It seems to me that the answer to "where are we going?" depends upon the response we make as individuals, and therefore as a nation, to the challenges the world presents to us today.

First of all we must realize that we are now living in what can be called the "Age of Nationalization," sometimes known as government monopoly, which is just as undesirable as business monopoly or labor monopoly. There is a developing idea that the state should not only supervise, guide, influence and assist the community and the individual in order to promote liberty, equality, justice and economic progress, but it should also regulate, support and guarantee security to the individual.

It may come as a surprise to some people that business is just as interested as government in the welfare of the people and for very basic reasons. The welfare of the people, the increased purchasing power of the people, are the foundations of business. Some segments of business may flaunt the public for a time but those which endure and prosper are built on a firm foundation of service.

Another challenge we face today is the question of war or peace between the United States and Russia. Facing up to the situation realistically, I believe we must proceed on the conviction that the only peace the Soviet Union wants is the peace of a regimented world controlled by Moscow. We are, in fact, already in the midst of a world wide civil war launched by Russia against all the institutions which we believe give meaning, purpose and direction to the conduct of human affairs. I recommend that as a policy, and in our own selfish future interests, we should consider and handle *all* of non-Communist Asia on a regional basis—as we do Western Europe. In addition, we should begin to integrate these areas politically and economically. What I recommend is that we supply Asia with simple agricultural tools, seeds, fertilizer, and, whenever justified, a power plant, cement mill, textile mill, or other basic industrial equipment.

WILLIAM E. KNOX
President
Westinghouse Electric International Co

As president of Westinghouse International and 11 affiliated companies William E. Knox directs extensive business activities abroad. He joined Westinghouse in 1921 after graduation from the University of New Hampshire and soon transferred to the International Co, of which he became vice president in 1944 and president in 1946. He has been awarded the Westinghouse Order of Merit, decorations by the governments of Chile, Peru, Norway, and the Military Order of Malta as well as an honorary doctorate from the University of Uruguay.

Another of our efforts to hold Russia in check is the Point Four program which represents the view that material means can and should be used to achieve non-material ends. However, I do not think the American people will put venture capital—part of their savings—on the line without some changes being made. Under present world conditions, I think the only way to attract large amounts of venture capital abroad is to offer a tax incentive.

In addition, there is another weapon which we have yet to use to the fullest in the cold war. I am speaking of the American worker, the soldiest bulwark against communism in the world. The task confronting management is to solidify the confidence of the worker by honestly telling him the real facts about his economic system as compared with others. Workers have a desire to belong to something, to work with companions and gain their approval, and as a result these workers are being torn between the striving to excel and the desire to conform.

In conclusion, if we ignore our duty to the nation we ignore our duty to the world. We have the right system if we use it. We must toughen the fibre of our national character by making our way of life dynamic and effective for all the world to see. When we do this, we shall be in a position not only to tell "where are we going?" but we will have good reasons to expect that the world will follow.

The Customer, the Investor, and You

Promoting home ownership of common stock can be a powerful force in industry stability and in support of free enterprise

IN RECENT YEARS radical changes have been brought about in the financial and organizational framework of many of the companies in our industry. Under the administration of the Holding Company Act, we have reached the point where the industry is made up of local area companies or regional systems. Through these sweeping changes, large amounts of common stock in operating companies came to the market.

The need for additional financing to provide for the heavy construction expenditures in the past four years has placed a substantial burden on equity financing and expanded stock ownership. That this demand has been met, is a striking expression itself of the confidence of investors in the soundness and desirability of utility securities.

The estimated expenditures needed for the four years ending in 1953 are about $6.7 billion. Based on the experience since 1945, about $1.6 billion of common and preferred will have to be placed with investors. So again there are prospects for still further growth in our stockholder roster. It seems hardly necessary to point out the magnitude of this task. With the present policies of our federal government and the double taxation of dividends, the large individual investor is seeking other investment media than equities. The play of these forces is making it necessary for managements to look to the small investor more and more. Large numbers of our customers already own our preferred and common stocks. Many more will do so if given the opportunity.

This idea of building up home ownership is taking hold. The Hartford Electric Light Co has 83% of its common stockholders residing in its home state. San Diego Gas & Electric has 77% of its common and 83% of its preferred stockholders living in California. Others have similar records.

CHARLES E. OAKES
President
Pennsylvania Power and Light Co

Charles E. Oakes has actively promoted home ownership of Pennsylvania Power & Light through a program to sell stock in the company's service area. A graduate of Oregon State College with an MME degree from Cornell University, he joined Pennsylvania P&L in 1923 after service with the National Bureau of Standards and the Federal Power Commission. From 1939 to 1945 he headed Birmingham Electric Co, then returned to Allentown as president. Mr. Oakes is a past president of Pennsylvania Electric Association and EEI.

Some companies have gone further and opened the way for the employee. The record shows that hundreds of employees have taken advantage of such opportunities. Philadelphia Electric Co now has 30% of its employees owning stock. Pacific Gas and Electric Co reports 40% of its eligible employees in July 1949 took advantage of the opportunity to purchase shares of the preferred. Employee stockholders, generally, become more concerned with the efficient operation of the business. Their personal interests become more closely attached to the preservation of the basic principles of our American philosphy.

We have a program of encouraging "home" ownership in the Pennsylvania Power & Light Co. Company policy has been directed towards this end for the past four years and it is producing the desired results. From early in 1947 to the end of 1949 our common stockholders living in the State almost doubled and the number of shares held more than doubled. In this same 20 month period, the number of common stockholders in the service area tripled and the number of shares held increased 285%.

This PP&L Co "home" ownership program is very broad in scope so as to employ all means of communication. Early in 1948 we made a presentation of our post-war operating, construction and financing problems at a meeting before the members and staff representatives of the Pennsylvania Public Utility Commission. At stockholder meetings we present facts about the past and future development of the company. When proposed financing has been a subject for consideration, company employees call in person or by telephone on all of our stockholders in the service area. We also hold regional stockholders meetings. Coincident with and continuing for some time after these regional meetings, a series of illustrated talks are given by company officials before service clubs throughout the area.

At the present time there are an estimated 3½ million owners of the equity securities of the electric industry. About one for every 10 customers. Some companies have as many as 1 for every 5. With this latter ratio as a goal, we could reach a total of 7 million stockholders—a formidable bulwark against government encroachment in private business.

Your Employees Want to Help

How our utility organized to inform its employees about the company's policies and affairs, its current and prospective problems

WE HAD often speculated concerning what really would result if we could find a way to keep every member of our organization informed:

First—about the business and economic philosophy on which our company is operated and upon which our policies are based; and

Second—about our current and prospective problems and how we are trying to solve them.

A program for taking this information to them was developed and launched early in 1946. By October 1949 we succeeded in getting this program into full operation.

Four definite principles form the foundation for this program:

1. The program must be prepared, administered and directed personally by some top executive who participates regularly and actively in the consideration of policy matters;

2. It must be conducted with complete frankness and sincerity and without evasion or equivocation;

3. It must be restricted rigidly to the dissemination of information concerning the philosophy, policy problems and affairs of the company;

4. It must provide for a free two-way flow of questions and suggestions throughout the entire organization.

Through this activity we hope to develop a contented organization—all of the same mind and with a common purpose. Such an organization will necessarily produce the greatest benefits for all concerned—employees, investors and public.

Our program is prepared, administered and directed by the executive vice-president and the operating vice-president, assisted by the personnel department through the director of the employee information program. Each afternoon these officials summarize the day's executive problems and prepare a "Current Events" agenda from the summary. These officials also prepare "Outlines" covering the philosophy upon which the company's policy is based.

W. E. WOOD
Executive Vice President
Virginia Electric & Power Co

Veteran of 43 years in the utility industry, William E. Wood has headed the Southwestern Public Service Association, the former Virginia Public Utilities Association, and the American Transit Association, a national organization of the transportation industry. He spent his early career with Stone & Webster properties, joined Vepco, then Virginia Railway & Power Co, in 1925. Later he was vice president of Vepco's parent, Engineers Public Service Co, and president of Virginia Public Service Co. When the latter was merged with Vepco in 1944 he became executive vice president.

These "Current Events" and "Outlines" are presented and discussed at regular monthly staff meetings of general officers, divisional officers, major department heads and district managers; about 40 in number.

These staff meetings were held for almost two years before we felt that the members were prepared to carry this information on to all other management employees. This group includes all supervisory employees from the staff on down through first line foremen.

For this second phase of the program our 450 management employees were subdivided into groups of no more than 20 employees. Regular *bi-monthly* two-hour meetings are scheduled for each of these groups. Staff members are assigned to conduct them. A "Current Events" summary and an "Outline" is used in conducting these meetings. Through this procedure, all supervisory or management employees receive, in effect, the same information furnished the staff and are trained in how to carry this information on to the non-supervisory employees. Again two years were consumed in informing the supervisors and in training them to conduct non-supervisory group meetings. By October 1949, after about four years of preparation and training, we felt prepared to launch the third, final and most important step in our program—conveying this information on to our 4,000 non-supervisory employees. This is the real objective of the whole program.

The non-supervisory employees were subdivided into similar small conference groups. Regular *bi-monthly* two-hour meetings are also scheduled for them.

All meetings, from staff to non-supervisory, inclusive, are divided roughly into three periods, as follows: (1) "Current Events"; (2) "Outline"; and (3) a question, answer and suggestion period. Leaders are instructed to answer all questions. We know of no way to measure the improvement in operating efficiency but we maintain that "Your Employees Want to Help You," if you will tell them what you are trying to do.

Load Building Based on Load Research

Aims of 5-year program of residential sales promotion set by effect on system load indicated by data on load characteristics of appliances

DURING the next 5 years the promotional goal of our company provides for the additional installation of approximately 100,000 ranges, 100,000 clothes dryers, 80,000 water heaters, 300,000 television sets and 30,000 calcinators.

Assuming that we are not too optimistic and we attain our goal by 1955, we shall have added appliances with an approximate total connected load of 1,715,000 kw in addition to that which we have today. The additional demand at the time of the system peak, we believe, will total less than 162,000 kw. Due to the diversity of demand, it will only be necessary to provide 162,000 kw of additional generating, and some transmission and distribution capacity to serve this increased load. The added revenue will be about $11,102,000 annually for the total 640,000,000 additional kwhr that will be used. The load factor of this load is estimated at 28.5%.

Detroit Edison now has 843,691 residence and farm customers on its lines. Their average annual use is 1,884 kwhr per customer. At the end of 1949, there were on the company's lines 221,000 ranges, 16,000 clothes dryers, 43,000 water heaters, 180,000 television sets.

The range load comprises about 12% of our system peak and is therefore not particularly profitable when it is not complemented by the use of other major appliances; however, a particularly interesting characteristic of our range customers is the high saturation of other major appliances in their homes. A study of this, which was conducted at the same time as the range load study, indicated that our electric range customers have: (1) A 98.5% saturation of refrigerators, while the area saturation is 86.5%. (2) A 15.7% saturation of water heaters, while the area saturation is 6.8%. (3) A saturation of 25% in ironers, with a system saturation of 14.4%. (4) A saturation of 9.3% in dryers, with a system saturation of 1.5%. (5) Freezer saturation of 12%, while the system saturation is approximately 3.7%.

FRED A. COMPTON
Vice President
Detroit Edison Co

Fred A. Compton was general sales manager of Detroit Edison before he was elected a vice-president in 1949. He has been with the utility since 1914. After graduating in engineering from the University of Michigan, he joined Detroit Edison's construction department. Later he moved to the purchasing department, where he was made assistant purchasing agent in the middle 30's and purchasing agent in 1949. He was an officer in World War I and during World War II was active in a utility material procurement and exchange program.

This emphasizes the fact that the range is a sales leader and in order to promote the theme of "All-Electric Living," it appears essential that the range must be one of the first major appliances to be sold to the residential customer, and the ownership of a range in itself will help to sell the other applications and uses of electricity in which we are all interested.

Our interest in the continued increase of electric service by our residential customers dictates a more thorough knowledge of its component parts from which we can establish a better balanced promotional program. This search for knowledge must be a continuous study. We have and are conducting a series of load studies to determine what effect the present saturation of certain major appliances has upon our system and residential loads; and the subsequent effect of a still greater saturation.

Our 5-year program of residential load development rests on 4 fundamental principles:

1. Development and growth of this load continues because there still exists a vast unexploited field of electrical usage. They demand that we study all possible applications of electricity immediately and at the same time acquaint ourselves with their load characteristics. Otherwise, we may have an undesirable load thrust upon us or a desirable load builder may be ignored.

2. Our residential load is a stable source of revenue and can be enhanced through a planned load-balancing program.

3. We have all heard the argument that the investment required to serve a range load, a dryer load, or a water heater load does not offer a sufficient return. However, it can be shown that a sufficient increase in the saturation of domestic appliances as a part of an over-all load balancing program increases the diversity of use, thereby decreasing the utility investment cost per unit.

4. Our industry is dependent upon good customer relations. Therefore, any promotional load-balancing program directed toward the residential customer should be properly designed to maintain these good relations.

We Will Benefit From Soil Conservation

The industry must assist Soil Conservation Districts, the only non-government agencies empowered to guide government and private projects

MEMBERS of Edison Electric Institute should become interested in and aid Soil Conservation Districts in their efforts to attain these goals:

1. To guarantee permanently the productive ability of American soil.

2. To make every contribution possible to conservation and control of the country's water resources.

3. To make every contribution possible to conserve and protect our wildlife resources and to extend and protect our recreational areas.

Soil Conservation Districts are the best method yet devised for developing and improving the science of proper land use and for applying this science to every acre in America without necessitating a change in the form of government.

There are now more than 2,200 districts organized under state law and run by farmers and ranchers who devote time and effort to get this job done. Some states are completely covered by Soil Conservation Districts. Boundaries of these districts enclose more than three-quarters of the agricultural and ranch lands in this country. These districts are the only organizations of independent citizens and taxpayers empowered and directed by law to coordinate efforts of every federal, state or private agency which has an interest in proper land use.

These districts are using and have agreements with many other federal and state agencies, as well as such private organizations as schools, colleges, service clubs and banker's associations. Their job is educational as well as operational because they assist the landowner to actually establish the specific plan.

Today, various methods of achieving flood control, water conservation and adequate supplies of water for agricultural and industrial needs are hotly debated issues in America. Those of you interested in adequate water supplies, whether for hydro plants, steam generators or growing industrial communities, must realize the increasing demands being placed on available supplies, the irresistible power of voters in their search for water, and the consuming need for well organized water conservators and control. There is no question but that America's water policy, if it can be so designated, has been neither logical nor unified but of a very patchwork design. We have attempted to control our rivers from the bottom up by means of great structures, rather than from the top down with more simple proper land use practices. Great dams have been built at fantastic expense with little thought given to the control of watershed and its silt producing ability. Many great dams have incorporated in them expensive silt retaining areas yet this silt might never have reached the dam area if a portion of the money had been spent on watershed protection. Soil Conservation Districts as units or in groups, or larger locally controlled organizations such as the Muskingum Conservancy District, can be of vital importance to the proper conservation and control of our water resources.

It behooves members of EEI to take an interest in the work of Soil Conservation Districts. The 10,000 and more farmers and ranchers who make up the governing bodies of these districts are giving of their time and effort to form district policies.

They have State Associations in all but three states and they have a National Association headed by Waters S. Davis, Jr. of League City, Texas. These men solicit your support, both financially and in the interest which you can take in the proper use of land under your control. They represent the best that there is in democratic government because they are in a position to coordinate and control great federal and state projects at the land level where, in the last analysis, the work must be done. It is the speaker's belief that you will find Soil Conservation Districts becoming increasingly important as time goes on, and that you will want to collaborate with this movement which will mean so much to the future of your industry and the future of our country.

KENT LEAVITT
Past President
The National Association of
Soil Conservation Districts

When Kent Leavitt retired as president of the National Association of Soil Conservation Districts, Rep. Ben F. Jensen of Iowa termed him an "outstanding leader and champion of conservation" and gave him a lion's share of credit for the association's "rapid growth and welding together." A Dutchess County, New York, dairy farmer, Mr. Leavitt helped organize the New York State Association of Soil Conservation Districts and was its first president. He headed the national group from 1947 to March, 1950, and continues on the council.

Give Farmers Their Opportunity

Farm price program of The Farm Bureau is geared to an expanding economy and preserves full opportunity for farmers

WE are all aware of the movements afoot today that are aimed toward a false hope of guaranteed security. When placed in their true light, they will themselves be the stumbling block that will not only destroy our individual freedoms and incentives, but also will destroy the sound security that a prosperous and progressive America offers us.

In this country we have a tradition of freedom, opportunity, and just rewards for individual efforts. On this tradition we have built well in the past. Are we ready to trade it off for something else? Or are we going to continue to build on a system which has put this country in the forefront of the world?

The field of agricultural policy today provides as good an illustration of this choice as I can find.

We have the problem of keeping such government programs as may be necessary consistent with an expanding, dynamic economy, with full production of the real wealth which makes for high living standards. It is proving to be no small task.

Farmers no longer live on what they produce themselves. They live on what they can buy with that they get for what they produce. What the farm family produces constitutes its real claim on society for a high standard of living, and in this respect agriculture has an enviable record.

In the early days of this nation's history, 90% of the American people were farmers. Now only 18% farm, if you take census figures on farm population. Actually about half of these census farmers produce 90% of the farm commodities.

Differences arise when those who discuss national farm policy fail to realize that the problems of the farmers who produce the bulk of our agricultural commodities are different from the problems of the other half of agriculture.

HERBERT W. VOORHEES
President
New Jersey Farm Bureau

Herbert W. Voorhees, president of the New Jersey Farm Bureau and past president of the New Jersey Farm Electrification Council, heads Free Farmers, Inc, an organization formed to combat John L. Lewis' attempt to organize Northeastern dairy farmers. Mr. Voorhees operates a 400-acre farm in Mercer County, where he raises Guernseys and develops new strains of field crops. A director of the American Farm Bureau Federation since 1944, he belongs to its Soil and Water Conservation and Flood Control Committee and to the N. J. State Soil Conservation Committee.

There are nearly a million and a half of these farmers who are primarily subsistence farmers. Their problem is not a price problem. It is a problem of opportunity.

Let's just see what the application of "guaranteed" prices or guaranteed security does to the farmer who needs land and machinery and opportunity, say one who gets $750 gross in an average year. He may get a higher price than before but, of course, he has to be content with less production. We must, of course, have controls to make such guaranteed prices effective. This leaves him about the same income, or at the very best, only a very little more. This is not good enough for America. It is unnecessary in this country to stabilize and perpetuate poverty thus, and it is cruelly dishonest to hold out price guarantees to these farmers as an answer to their problem.

The Farm Bureau *does* believe in farm price programs. They are needed because agricultural prices rise and fall much more sharply than do prices of non-farm goods. These sudden declines in agricultural prices are not matched by similar declines in prices of things farmers buy.

However, we consider farm price support programs as a form of insurance against drastic price declines, rather than as a method by which government guarantees profitable prices to farmers.

Support prices should be flexible, geared to the supply of each commodity supported. This reduces the danger of accumulating unwanted surpluses, and permits the market to remain an accurate guide to intelligent production.

Price supports are not in themselves, an answer to the farm problem. A farm program must provide for soil conservation, improved farming methods, better marketing practices, and encouragement of adjustments in farm operations to produce more of the foods needed in improved human diets.

These are the essentials of the Farm Bureau's program. It is consistent with the American tradition, and does not place the individual farm family in a position of permanent dependence on the federal treasury.

The highly publicized Brannan Plan represents the opposite philosophy on farm programs.

The Sales Job Ahead

The most important thing a sales department can do is to create good will and a friendly understanding spirit among our customers

ONCE AGAIN the "spotlight" is focused on the sales department and its activities. No longer is the sales department a stepchild but salesmen are again taking their place as one of the most essential groups in the electric utility business.

This changed situation which has taken place quite suddenly presents some interesting questions:

Do we have a well organized and well trained Sales Department?

Are the sales people themselves ready and anxious to work at sales?

Does Management realize the amount of money and manpower required to build an aggressive and functioning Sales Department?

Is Management ready and willing to actively support an all-out Sales Program?

Does Management understand that while a Sales Department can be torn down "overnight", that it is harder to build and, in fact, takes longer to build a functioning Sales Department than it does to construct an addition to a power plant? For in restoring morale and rebuilding a Sales Department, you are changing, molding and training *men*, rather than dealing with inanimate objects.

Knowing very little about selling—and hence an authority—may I make four general observations about selling. First, we must believe in ourselves. If there is anyone who needs confidence it is a salesman. He must be a confirmed optimist. We must know our product and how it can be used. Not just how our customers are using our service, but what additional use they can make of our service. Just as important, we must approach selling from the customer's viewpoint. What does the customer need, what does he want, what is good for him. Finally, we must work and work hard. Most of us do not use all of our abilities nor our talents.

While I had not planned to discuss the details of our company's sales program, I will briefly outline what we expect our sales department to accomplish.

G. W. EVANS
Vice President and General Manager
Kansas Gas & Electric Co

G. W. Evans was made general manager of Kansas G&E last year. After attending Trinity University, Texas University, and the University of Southern California, he started his utility career in 1924 as a clerk with Public Service Co of Oklahoma. Four years later he moved to Oklahoma Power & Water Co, of which he was vice president and secretary when he left in 1937 to become vice president of Missouri Public Service Co. Later he headed Missouri Edison Co, then joined Kansas G&E in 1947 as assistant to the president and became a vice-president in 1948.

First, we expect them to retain all of our present business. This may sound easy. However, we find that our customers are beginning to check costs closer than ever. Our competitors are again actively in the market trying to convert our customers to other kinds of power.

The main responsibility of the sales department is to build profitable new business, with consideration for type of load and necessary service cost.

The application and use of electricity in commercial establishments has lagged in most areas. It is our idea that our commercial sales people should know some of the fundamentals of retail selling. Thus we can assist commercial stores in a modernization program.

A well planned industrial development program includes assistance to present industries in the nature of using our service more efficiently, multiplying the output of manpower, helping them find markets for their products and furnishing sales hints.

One of the least profitable, from a dollar return standpoint, but at the same time one of the most important activities of the sales department, is working with the school and municipal authorities. We have actively engaged in a concerted school lighting program.

I know that this is an over-simplification of the problem. However, it is evident to me that accelerated sales activities can be a partial solution. Ten years from now we will look back and marvel at the puny vision which we had today, and, further, we will wonder why we did not see how many new and important ways electricity would be used. One of our solutions or at least a large part of the solution is sales and more sales.

The selling job ahead is a big one—retain our present business, build profitable new business through creative salesmanship, and create good will and a friendly spirit among our customers. This is an opportunity—not only for the sales executives but it is a definite opportunity and responsibility of management of every electric utility company to take an active interest and lead the way in true salesmanship.

Our Stake in Bituminous Coal

Consumers of coal must continue to be interested in coal's problems to prevent price fixing and government controls

TODAY the bituminous coal industry in this country is a progressive, energetic, modern business and we all have a tremendous stake in keeping it that way. The problems in coal which must have a satisfactory answer revolve around four major considerations.

As far as *labor* is concerned, it would appear after nine months battle with the union, which just ended last March, that we haven't much basis for hope. However, I earnestly feel that progress was made in that long fight and that we can do a much better job in the future.

Secondly, considering the excess capacity we have in coal, it appears that we have a current market for some 450 million tons per year. Because of the seasonal nature of our business, to properly take care of that tonnage, we must have a capacity of at least 500 million tons.

Under normal circumstances coal is used up and mines go out of existence and certainly very few major new operations are going to start, in view of the present threat of over-capacity Therefore, the very lack of continuing investment will cause a shrinkage of capacity. This brings me to the conclusion that today there are not sufficient modern efficient plants which carefully prepare coal to produce more than 500,000 tons in this country. Therefore, the excess which does exist has really no permanent place in this industry because of either costs, lack of consumers or quality of product.

Let us consider the third problem, which is competition with other fuels, primarily oil and gas. This competition is severe and while we don't exactly welcome it, we accept it under a free enterprise system.

We are waging an intense fight against foreign oil flooding some of our natural coal markets at dumped prices. The present importations of foreign oil are 70% greater than they were in 1946 and are currently running approximately 50% greater than a year ago. Our main objection lies in the fact that currently almost 50% of this foreign oil is residual fuel going under boilers to take the place of coal and the balance of crude makes a far greater percentage of residual than is true of our average domestic crude oil.

If our competition is restricted to domestic fuels, we see a gradual expansion in the market for coal as a growing population uses more and more energy through the years. Allowing for an increase in the use of oil of around 30% in the next 15 years and for an increase of 50% in the use of natural gas in the same period, it is altogether possible to have a market for coal of from 650 million to 700 million tons in the year 1965.

The fourth problem of the coal industry revolves around the question of whether there can be sufficient earnings in the industry, taking into account its difficult labor and competitive circumstances. Earnings over the last few years, because they were spent by practically the entire coal industry on properties and equipment, have permitted coal prices to be reduced some 10% in the last 18 months, in spite of the recent increase in costs resulting from the last contract with the miners' union. Unfortunately, while the coal industry was reducing its prices, it was necessary for the railroads to increase the freight rates on coal to an extent at least equal to the amount that our prices were lowered. Earnings are also necessary to allow this widely scattered industry to fight against unreasonable and unwarranted demands of their employees.

As severe as the problems are in coal, we have seen that they all have a possible solution.

To accomplish these things, however, and stay away from the torturous road of price fixing and government regulation, we need to have the majority of consumers of coal take a continued interest in coal's problems and help in one primary essential way. That one way is to limit the purchases of your coal to those sorts of properties which you would have if you mined your own coal.

GEORGE H. LOVE
President
Pittsburgh Consolidation Coal Co, Inc

Active in the coal industry since 1926, George H. Love has been president and director of Pittsburgh Consolidation Coal Co since its formation in 1945. He is also vice president and a director of the National Coal Association and a director of the American Mining Congress. Companies on whose boards of directors he serves include General Electric Co, The Pullman Co, St. Joseph Lead Co, Mellon National Bank & Trust Co of Pittsburgh, and M. A. Hanna Co of Cleveland. Mr. Love is a graduate of Princeton University and Harvard School of Business.

Profits That Can't Be Measured

Reaping profits in improved employee relationship and better community reputation by recognizing the humanitarian problems of its people

THERE IS a growing consciousness among the free countries of the world that we are engaged in the greatest war, short of a shooting war, to preserve the last ramparts of freedom. I sometimes wonder, however, whether Americans are as practical and realistic in their outlook as are the others.

If I were to make a quick diagnosis of our situation today, and mind you, I do not pose as an expert, I would say that American business has proved to be the greatest salesman in the world of products and services, and the "lousiest" salesman of ideas.

We have failed to inform our employees so that they will be able to apply constructively this new power they now hold in their hands.

Let us recognize once and for all that men and women in the shops are highly intelligent. However, their knowledge of economic and social problems, as applied to our business and thus their jobs, is limited. This lack of knowledge is nobody's fault but our own.

Right now, I'd like all business to join with me in a pledge to develop a greater awareness of humanitarian problems. A pledge to aid in reaching a solution to these problems. And finally, a pledge to let the American people know what industry is doing about these humanitarian problems.

Your efforts in this field will result in many rewards.

You will find an enlightened employer-employee relationship.

You will bring about a better community reputation for the company.

You will strengthen your stockholder relationships.

Our most important customers in the market of economic thought are our own employes. We need to know them as we know our product customers if we are to repulse the trend towards socialization.

I submit to you that our work in human understanding is the front line of our attack.

WALTER GEIST
President
Allis-Chalmers Manufacturing Co

Walter Geist started with Allis-Chalmers in 1909 as a blueprint and errand boy, became its president 33 years later. He got most of his formal education from night and correspondence courses, now holds two honorary degrees and is a trustee or the equivalent of several universities. Among the firms and organizations of which he is a director are York Corp, the Wisconsin Manufacturers' Association, and the National Association of Manufacturers. He received the Modern Pioneer Award in 1940 and was decorated by Norway's King.

I should like to review our own recent programs because it proves the thesis of my case.

We used to fire our alcoholics. We don't any more. About two years ago, we began a program to solve this problem. A psychologist was hired as a consultant. Psychiatric consultant services are also utilized. It was necessary to hire a full-time alcoholic counselor, who is in a sense a type of case worker. He had been the secretary of Alcoholics Anonymous in our community for eight or nine years and is a member of that group. He has proven to be a great asset to the program.

Of 17,000 employees at the West Allis Works, 71 reportable cases are in our active file. Tardiness among these alcoholics has dropped 60% in 9½ months. Absenteeism is 70% less.

In 1947, these 71 drinkers lost more than $19,000 in wages. In 1949, the 71 problem drinkers lost less than $14,000 even though the program didn't get underway until March 15, and despite general wage increases.

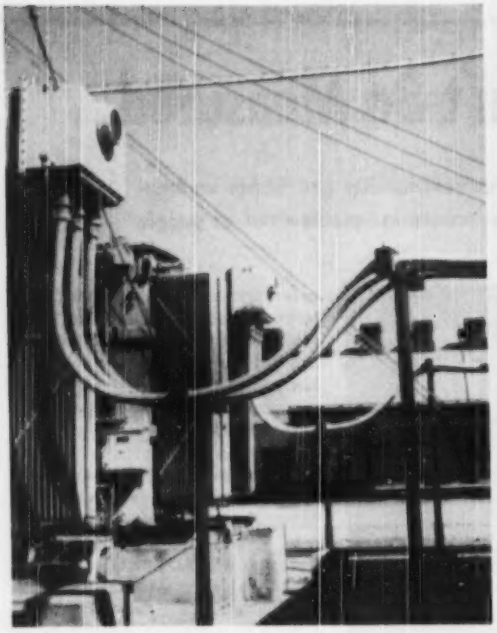
I would not be truthful if I didn't admit that selfishly this program means dollars and cents to us. But there is a far greater factor which cannot be measured in dollars and cents. That is the rebuilding of a man's life, the restoration of a family circle and a home environment in which every young American boy and girl should be reared.

We have a deep interest in the young people who will be our citizens of tomorrow. Some of them will be our employees.

A scholarship program for children of our employees has been established which will supply annually 20 scholarships of $500 each. These may be used by scholarship winners at any accredited school of their choice.

We are active in the 4-H program and provide scholarships annually to the 4-H Club Garden Contest winners.

We feel that if the American people become convinced that industry is failing to meet the challenge of the time, they will be ready for those whose only program is to stir up suspicion, unrest, and chaos so that they can sell their political philosophy. We can overcome this by giving the American people further constructive solutions to the problems which we find in the world of today.



OVERHEAD CABLE rather than open bus is used for all interconnections for high voltage feeders to rectifiers and other large blocks of power to eliminate contamination of insulators, etc

POLYVINYL INSULATED and jacketed armored control cable on racks run from various pieces of equipment to main station control switchboard eliminates costly conduit installation in power plant

Selecting Cable for Chemical Plants

Here's why Dow Chemical selected the various types of cable and wire insulation in their Gulf Coast plant. Over 10 years installation record reveals causes and solutions for failures

ELECTRICAL ENGINEERING IN INDUSTRY

F. S. GLAZA
Chief Electrical Engineer
Texas Division
The Dow Chemical Co

SELECTING CABLE and cable and wire insulation for a chemical plant is not only an electrical problem but also a problem in chemistry. Due to the presence of moisture, acids, alkalis, hydrocarbons, and various solvents where these cables must operate, this problem may become quite involved where the choice of insulating materials to be used must be held to a minimum number. Added to the problem may be elevated or low temperatures which may be characteristic of the process which the wires and cables must serve.

Based on a paper presented before the AIEE 1950 Winter Meeting

The selection of the cable or wire enclosing means, such as duct and conduit, must also be integrated in the problem. Each plant and each problem must be attacked from a separate viewpoint, and no generalization of conclusions for all plants or processes is possible.

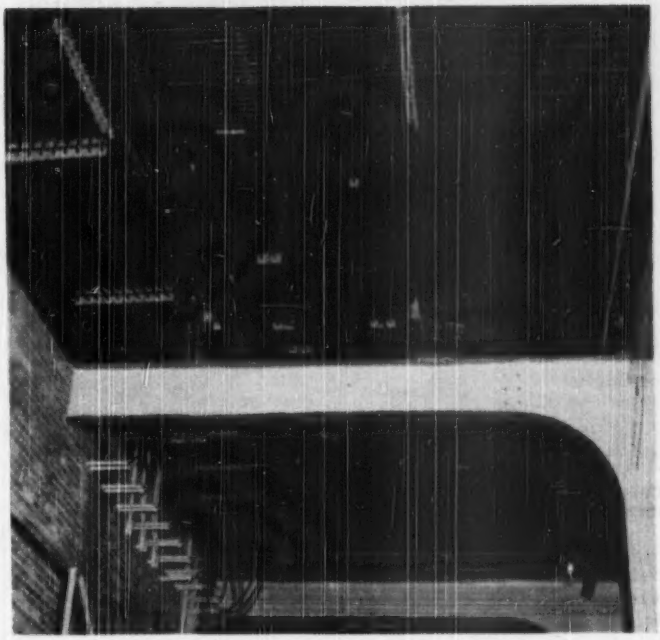
Electrolytic Plants . . . The selection of low voltage cable and wire insulation in electrolytic plants has been a process of evolution, using past experience as a guide and taking advantage of developments in the insulation art. Before the advent of Neoprene jacketed rubber insulated wire and cable, Type R, RP and RH rubber insulated wires with double cotton braids were used for all branch and motor feeder circuits below 600 v. Enclosed in conduits, special precautions had to be taken with insulating joints and gaps to prevent sneak currents from the cell lines from entering at one point and leaving at another, destroying whole conduit and wire sections due to electrolysis or heat evolved. The presence of chlorine and hydrochloric

acid in most of these plants corroded the conduits, chlorinated the rubber insulation, causing it to become cracked and brittle. Moisture in combination with acid in the air brought about electrical breakdowns. This resulted in frequent and expensive replacement with attendant interference with production. About ten years ago, conduits were abandoned and these circuits were run in Neoprene jacketed rubber insulated cables, in some cases with the three control and three power leads enclosed by a Neoprene belt, similar to control cable used in power plants. These cables were supported from porcelain cleats or rings, using corrosion resisting fasteners for support on the building structure. This system of wiring was similar to the old style of knob and tube, much lower in cost, and has given excellent results in these plants. The weakest link in this installation was the joints since only rubber and fabric tapes were available. Rubber tape was covered with cloth tape and then painted over with two or more coats of plastic type paints, which sometimes became porous and allowed the chlorine to attack the rubber. Several types of all-plastic and Neoprene faced tapes are now available, which should eliminate these troubles.

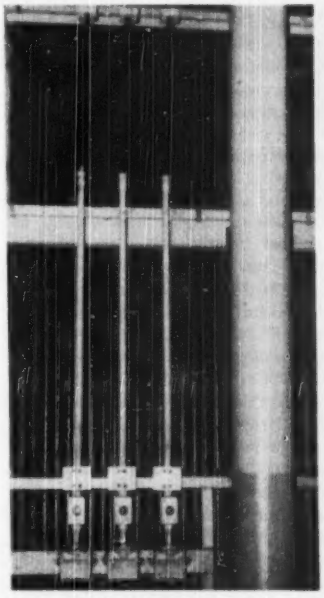
During the war, Neoprene for electric uses was unobtainable, so it was necessary to find a substitute. Polyvinyl chloride insulated cables were used and also were found to be excellent for this application. Again joints became troublesome. A polyvinyl tape was used in some cases with a mold for vulcanizing in place. This was found to be difficult and time consuming, so then the joints were treated as with the Neoprene jacketed cable. New plastic type tapes should take care of this trouble also.

A word of caution should be added here. Motor frames in some of these installations had to be left ungrounded. Operating and maintenance personnel must be warned to avoid contact with this equipment while it is energized.

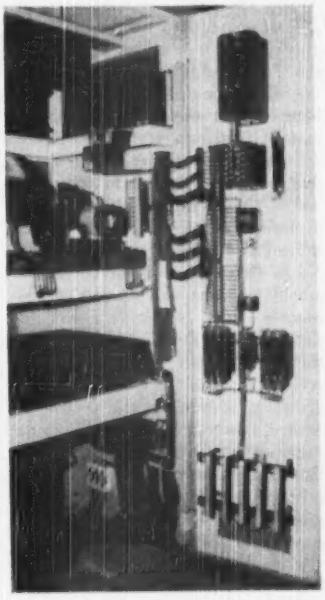
The low voltage wiring installation, as outlined above, has given excellent results. Few failures have been experienced during a period of approximately 10 yr. No changes are contemplated in this method of connecting motors or lighting circuits.



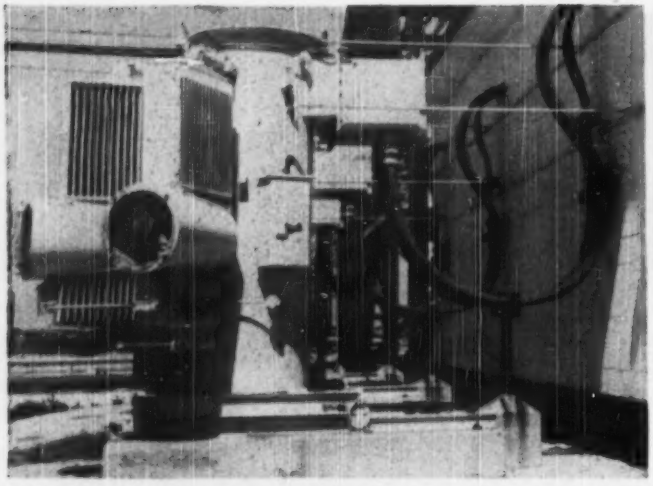
NEOPRENE JACKETED rubber insulated and polyvinyl insulated and jacketed multiconductor cable (approximately nine years service) supported from porcelain cleats with corrosion resisting fasteners installed in an electrolytic plant for motor and process control



CONDUIT ENCLOSURES are used for lengths of 5 to 10 ft where multi-conductor jacketed cables might otherwise be damaged



POLYVINYL INSULATED wire installed on rectifier control panel replaced V.C. flameproof braid. Glass cord is used for tieing



CABLE FAILURE at wall bushing was repaired by pulling slack cable through wall and reinsulating cable at point of failure as with ordinary cable splice.

Switchgear and Control Cable . . . control cable for the control of rectifiers and associated switchgear is run in some cases in underground conduits, in conduits embedded in concrete slabs, and sometimes in open conduit. Since the problem of electrolysis is present in these locations, it was decided to use nothing but polyvinyl insulated wire with a polyvinyl jacket or belt over all conductors. Two rectifier installations, totaling 45,000 kw of equipment each, have been so wired; and in approximately 10 years of service, only three failures were experienced on 2-conductor cables running to indicating lights. These failures were attributed to faulty splicing of compound when spliced at the factory in production. No dc electrolysis of polyvinyl compounds has been experienced, and no failures have resulted from this source. Since these cables have been subjected to salt water and to the ground chemicals present in process plants, in addition to the electrolysis hazard, this type of installation is entirely satisfactory. It is our opinion that leaded control cables are unnecessary and certainly would not give the service which we have experienced with polyvinyl insulated cable.

Switchboard and Panel Wiring . . . Considerable difficulty has been experienced with switchgear and control panel wiring, using the standard varnished cambric switchboard wire with flame-proof braid. Due to moisture, possible fungus growth, and air contamination, this type of wire tends to fail under metal fastening clips, resulting in control short circuits. Wherever conditions exist tending to promote such failures, control equipment is being rewired with polyvinyl insulated control wire. It is believed that polyvinyl insulation, or possibly polyethylene, either furnished with a flame-proof braid for protection, will furnish a more reliable installation.

Intermediate Voltage Installations . . . In electrolytic plants, motors and equipment operating at 2,300 v or higher can usually be located in one end of the cell line where the danger of sneak circuits and electrolysis due to the presence of buses and cells is negligible. It is possible, therefore, to run wiring to this equipment in conventional conduit. Cables used are insulated with an oil base compound and protected by a Neoprene jacket. They are rated at 5 kv to provide an extra margin of safety. Where feeders must be run into the cell area, multi-conductor cable of the mine type is used. This cable is provided with three power conductors and three ground conductors, all enclosed in a common Neoprene jacket. This cable is supported with porcelain cleats similar to those used with the low voltage wiring described previously. Both types of this cable have given an excellent service record.

High Voltage Cable . . . Feeders to rectifiers and other large blocks of power are usually rated 13.8 kv. They may vary in size from 500 to 700 Mcm, 3 conductor, and up to 2,000 Mcm or 2,500 Mcm, single conductor. All interconnections are made in cable rather than in open bus to eliminate contamination of insulators, lightning and surge hazards, and other atmospheric disturbances. Equipment interconnection was originally made in underground fiber ducts, using a varnished cambric insulated, shielded, and leaded cable with an outside rubber jacket to prevent electrolysis of the lead sheath. Frequent failures were experienced in this underground installation, and all of this underground power cable was later replaced by *overhead* cable. This overhead cable consists of varnished cambric insulation, shielding, tape, and a moisture excluding jacket of rubber or polyvinyl compound. The cable is then mechanically protected with an outer layer of flat or interlocking bronze tape. Most of these cables are 3-conductor, and so far, in a period of approximately five years, these open cable installations have not experienced a single failure. These installations serve approximately 200,000 kw of conversion equipment.

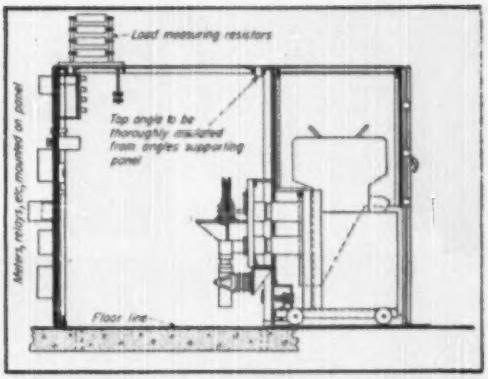
Single conductor cables serve as feeders from the power generating bus to the rectifier buses. These varnished cambric insulated cables, while having given satisfactory service, do not equal the performance record of the 3-conductor cable. This may have been due to faulty design in the beginning when shielding was not included under the moisture excluding jacket. Since then, new design cable has been installed and has given a satisfactory performance for the past three years without a single failure.

Process Plants . . . The installation of wire and cable in electrolytic plants provides by far the greatest number of problems and difficulties. The process plants occasionally approximate these conditions but only in limited specific locations. Since cir-

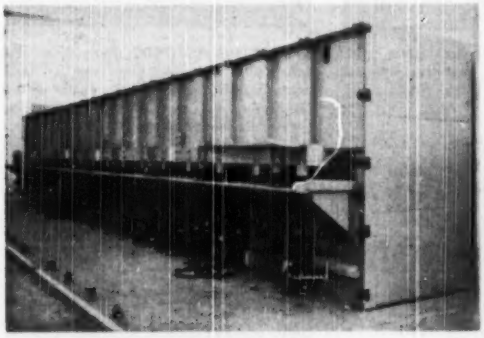
(*Continued on page 211*)

Isolation Increases Rectifier Feeder Protection

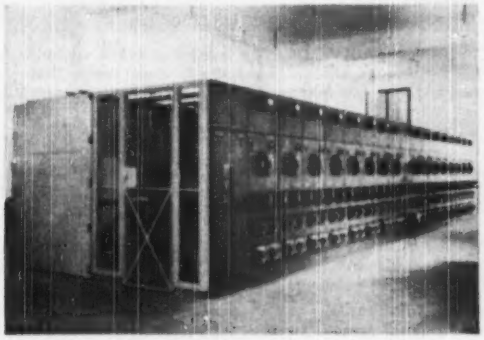
Design retains advantages of drawout breakers to isolate and insulate CB's, bus and control panels from ground


Load measuring resistors
Meters, relays, etc., mounted on panel
Top angle to be thoroughly insulated from angles supporting panel
Floor line

RING BUS at the substation feeds three 1,500-kw rectifiers as well as three 6,000-kva unit substations. A fourth bus section feeds a fourth 6,000-kva unit substation only. The entire station is operated by a load dispatcher by means of supervisory control equipment



METAL-ENCLOSED drawout circuit breaker compartments and 600-v bus. Cylindrical insulators along top and side isolate compartments from the angle braces which support the panels

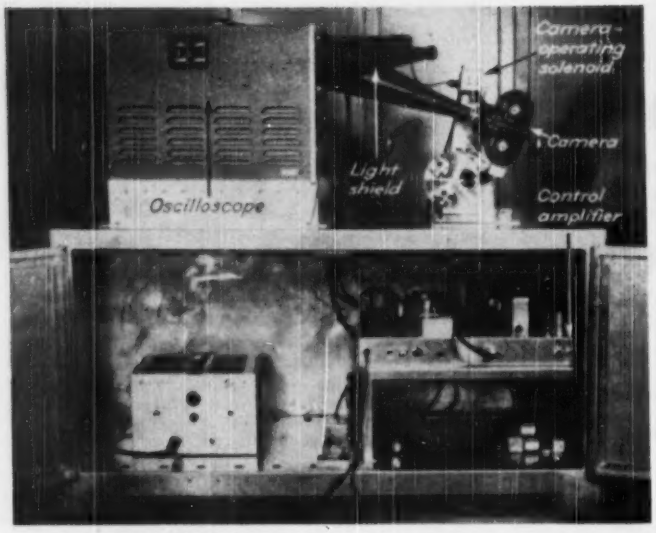


COMPLETED ENCLOSURE with all components resting on two ⅛-in. layers of Masonite insulation. Entire floor was covered with it after rectifiers were installed in another part of this room

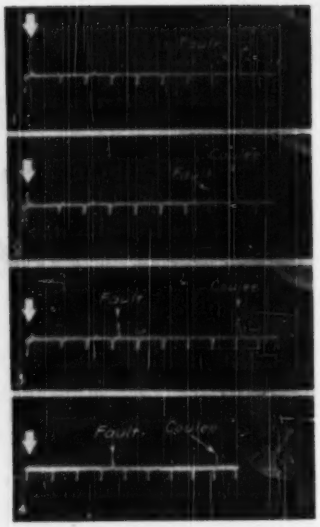
AS A RESULT of a serious bus fault in metal-enclosed drawout dc switchgear, feeder units of three 1,500-kw, 600-v rectifiers recently installed by Seattle City Light are electrically insulated and isolated from ground. Design of the new equipment was perfected by H. V. Strandberg, then supervising senior engineer in charge of design, after careful investigation of the bus fault in similar equipment which had been in service for three months. In order to retain the advantages of drawout breakers—ease of maintainance, minimum circuit interruption for maintainance, and elimination of the need for feeder transfer facilities—the general principle of drawout breaker design was retained. The equipment was designed with the concurring recommendation of the manufacturer for maximum isolation of control and power elements. The major problem in design was to provide an adequate insulation level in the various metering and control circuits.

Metal-enclosed drawout type circuit breakers, 600-v bus, and slate control panels are insulated from the floor by two ¼-in. layers of Masonite. Steel members supporting load-measuring resistors and providing lateral support for the slate panels are insulated from the circuit breaker compartment. Bus protection is provided by a sensitive double contact dc relay. It functions to ring an alarm if the metal structure becomes grounded, and trips all breakers connected to the bus if the metal structure assumes 600-v potential. As far as practical, all control, relaying and metering circuits are wired to provide separate grouping of conductors at different voltages.

The three 1,500-kw rectifiers are equipped with high speed anode breakers and semi-high speed cathode breakers, pedestal-mounted in the basement of the building. They feed a dc bus supplying sixteen feeders for Seattle's transit system. The substation also serves as a major distribution point, supplied by four 26-kv lines feeding a ring bus. Three bus sections feed the three rectifiers and three 6,000-kva unit substations. A fourth bus section feeds a fourth 6,000-kva unit substation only. Supervisory control equipment provides control of the entire dc station by the load dispatcher.



TYPE "C" FAULT LOCATOR installed at a BPA substation. Small clock motor pulses the line once an hour and moves film in movie camera frame. This provides continuous record of equipment operation. Locator is installed on all phases of two 230-kv lines

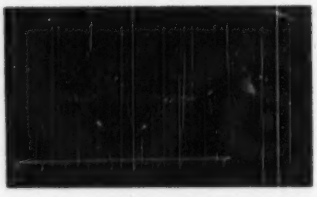


OPERATING RECORDS obtained by BPA during summer of 1949 with Type "C" fault locator installed at Spokane to mount on two 230-kv lines to Coulee Dam. Negative pips are 10-mile range markers supplied by oscilloscope. Estimated fault locations—(1) 2 miles from Coulee, (2) 10 miles from Coulee, (3) 33 miles from Spokane and (4) 33 miles from Spokane—were confirmed in all but second case where line was apparently struck without visible damage. (Arrows mark line discontinuity due to configuration change)

Transient Fault Locator Proves Out in Operation

First season of operation on two 230-kv lines demonstrates accuracy, dependability of Bonneville's type "C" equipment using echo-ranging principle with system of phase-selecting relays

L. R. SPAULDING
Bonneville Power Administration
Portland, Oregon



LIVE LINE TESTS staged on 51-mile Ross-Longview 230-kv line. Locator, installed at Ross substation near Vancouver, indicates that the fault is 30 miles distant

SATISFACTORY OPERATION of a new transient fault locator for high-voltage transmission lines can be reported by the Bonneville Power Administration based on actual operating experience records for the summer lightning season of 1949. Use of the equipment at two different locations on the Bonneville system has resulted in accurate location of staged faults on energized 230-kv lines.

The locator employs the pulse-radar method of echo-ranging* for fault location on energized lines, but does not depend on the surge from a fault to supply pulse energy. Instead, a phase-selecting relay system recognizes a fault and connects the fault locator through a carrier coupling capacitor to the faulted phase. In case of a phase-to-phase fault it is connected to one of the faulted phases.

The relay system also actuates a pulsing unit which applies to the line a single unidirectional (dc) one microsecond pulse approximately 33 milliseconds after start of the fault. An oscilloscope started by the initial pulse measures elapsed time for return of a reflection from the fault. This elapsed time is indicated by a positive pip on the screen at a distance along the sweep proportional to line distance to the fault. The initial pulse also triggers a camera actuating mechanism, which racks up a new film on the movie camera used to record operation of the locator. At the same time it illuminates a watch face to record time of the operation.

Operating records and constructional details are shown in the accompanying photographs.

* See also "Pulse Radar Used to Locate Faults" ELECTRICAL WORLD November 6, 1948, p 88.

Improved thyratron test set locates stubborn cable faults faster

Here's the biggest advance in cable testing in almost 20 years.

It is the kenotron—or voltage doubler—that is now being built into General Electric thyratron fault-reduction and localization cable test sets from 500 to 20,000 volts.

A thyratron set of 10-kv, for example, now automatically develops up to 27 kv d-c potential as needed. This high voltage starts a small current, rapidly reducing the resistance, to a point where the 5-amp d-c thyratron current will rapidly burn down the faulted point. Following burndown the set is used to apply an interrupted d-c tracing current permitting fault location by means of an exploring coil, test prods, and a galvanometer.

You save hours on stubborn faults. On stubborn faults, this can save you hours. It eliminates the trouble of faults re-sealing before you can switch over to the thyratron set.

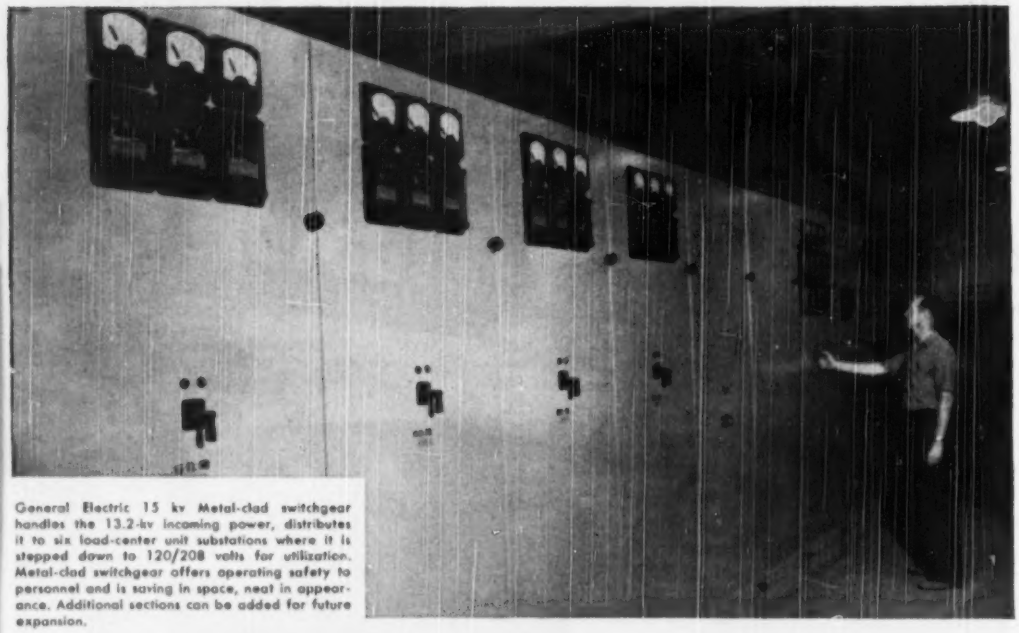
Your local General Electric Sales office can give you full information. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

The thyratron d-c Fault-reduction and Localization set employs the direct method of fault location. A continuous, high, d-c voltage is applied to the faulty conductor. When the fault resistance has been reduced by a current of 2½ to 10 amperes, an interrupted d-c tracing current is applied.

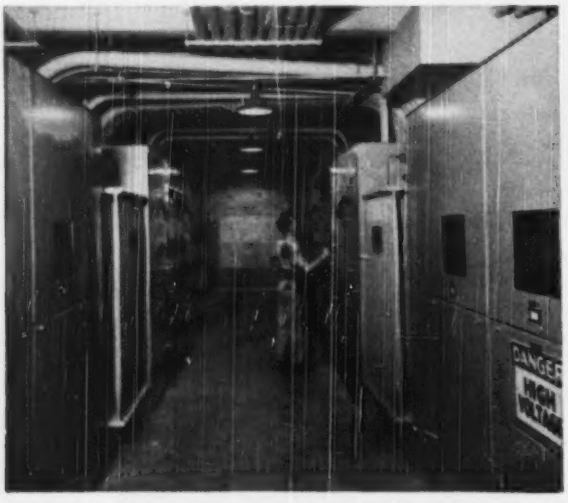
The thyratron set is usually best used in conjunction with a kenotron testing set which warns of weaknesses before actual breakdown in service occurs. The thyratron set is the fastest and most positive method of locating faults—whether found in periodic testing, or after a service failure.

GENERAL ELECTRIC

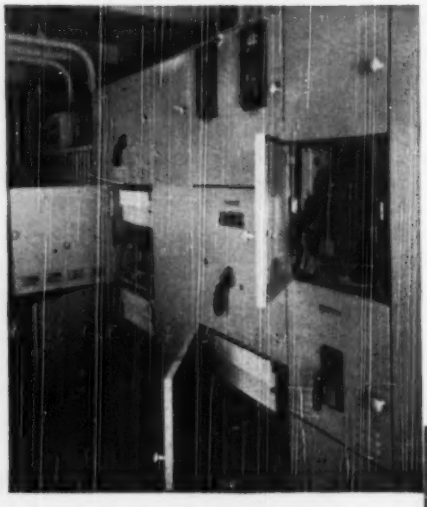
METAL CLAD SWITCHGEAR



General Electric 15 kv Metal-clad switchgear handles the 13.2-kv incoming power, distributes it to six load-center unit substations where it is stepped down to 120/208 volts for utilization. Metal-clad switchgear offers operating safety to personnel and is saving in space, neat in appearance. Additional sections can be added for future expansion.

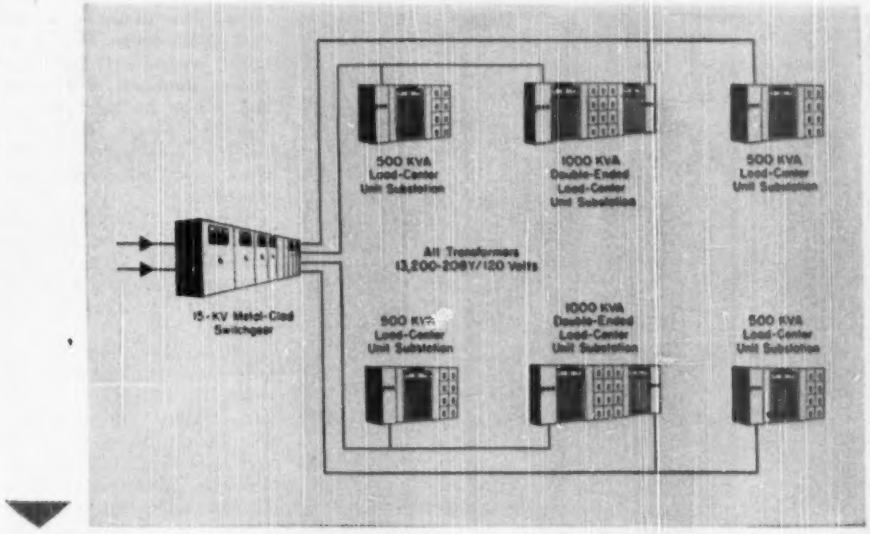


Load-center unit substations receive 13.2 kv power and step it down to 120/208 volts for utilization. Air switches on primary are easy to operate, blades are easy to see. Note entire load-center is metal-enclosed thus offering operating safety to personnel.



Low-voltage end of load-center unit substation showing air circuit breakers that have plenty of "IC" (Interrupting Capacity) to handle all short circuits. Breakers are of the drawout type, easily removable for inspection or maintenance.

HELPS PROTECT SERVICE AT TELEPHONE COMPANY INSTALLATION



In this installation General Electric Metal-clad switchgear receives the incoming 13.2 kv power and distributes it to six G-E load-center unit substations. Three load-centers, two single-ended units rated 500 kva and one double-ended rated 1000 kva, are located in the basement. Three other units of identical rating are on an upper floor. From these load-centers utilization circuits feed 208/120-volt power both upwards and down, and provide efficient, low-cost power at constant voltage wherever desired.

This installation is a complete General Electric project —one source of responsibility plus the very best in coordinated planning, engineering, manufacturing, and service facilities to give maximum savings and efficiency to the customer.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

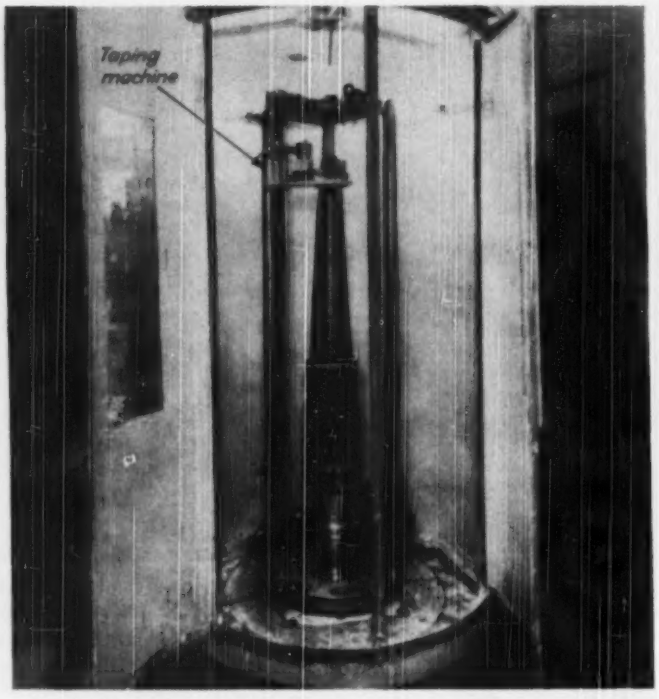
MODERN INDUSTRIAL power distribution systems using G-E switchgear are applicable to any industrial plant or commercial building where you want proper voltage for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs.

INVESTIGATE TODAY the many advantages of using General Electric switchgear in *your* plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—or write for the helpful bulletins listed below. *Apparatus Department, General Electric Company, Schenectady 5, New York.*

GEA-3083	Metal-clad Switchgear
GEA-4966	Low-voltage Metal-enclosed Switchgear
GEA-3592	Load-center Unit Substations
GEA-3738	Load-center Power Distribution

GENERAL ELECTRIC

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN



SEMI-AUTOMATIC TAPING MACHINE, which operates in an atmosphere of dry nitrogen, applies six-mil impregnated-paper tape over factory insulation on 138-kv cable terminal

Gas Pressure 138-Kv Cable Terminal Wound in Field

JEROME J. TAYLOR
The Detroit Edison Co
Detroit

BASED ON test results, and an aggregate service record of 34 terminal-years without a failure, the 138-kv gas-pressure cable terminal designed by Detroit Edison engineers appears to be better mechanically and electrically than previously available designs. Developed for operation on the company's 120-kv system, the new terminal experiences external flashover on impulse test at approximately 1,000 kv. Twenty-six of these terminals have been installed since 1942.

The terminal connects with the cable pipe, which is charged with dry nitrogen at 200 psig. Compressive force is maintained between the porcelain body and metal seats of the terminal by heavy steel springs, which are held by four strings of standard high-strength, 10-in. diameter, suspension insulators. The porcelain body, 52 in. high, is in the upper range of size for this particular class of insulation.

In winding the stud of the terminal, stripped cable is used as a base. Six-mil impregnated-paper tape, the same kind used in the outer layers of the cable, is applied over factory insulation by a semi-automatic taping machine. This device is an essential part of the design, since it is practically impossible to build up satisfactory insulation of required size and density by hand taping. The machine operates inside a closed housing (see illustration), the latter being continuously fed with dry nitrogen.

Because low internal nitrogen pressure excludes moisture, the winding process, which requires a day, can be interrupted in case of bad weather without detriment to the completed portions.

Before the winding operation begins, paper tape is scraped to remove excess oil. The tape is heated as it passes through the winding head. Two limit switches, progressing up and down on studs having different threading, automatically reverse the direction of carriage travel, thereby forming an obtuse winding cone at the bottom of the terminal, and a longer or more acute cone at the top. Knives automatically shave the tape to approximately half-width at reversal points, to obtain a flat lay, thus permitting continuous winding in full-spool lengths. Tape is butt-wound under tension.

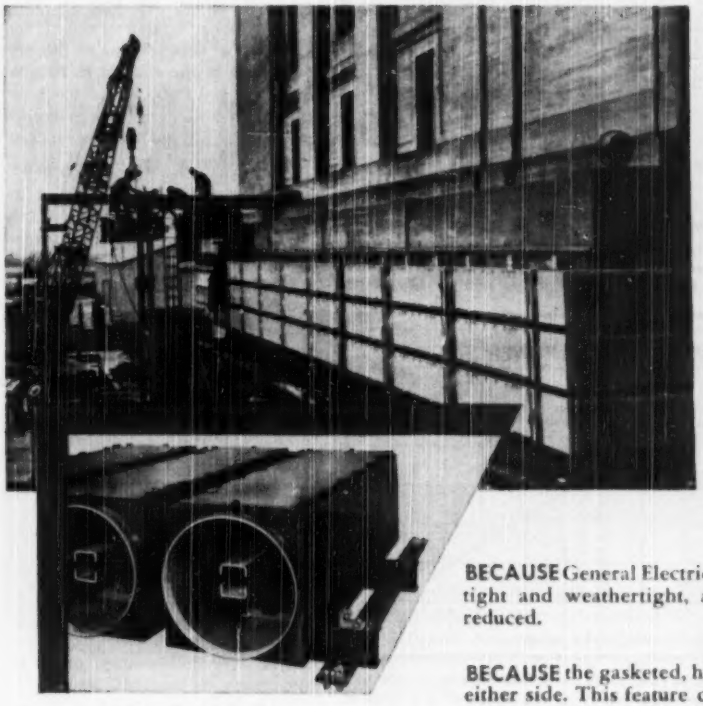
The completed winding has a dense, solid structure, with little included gas space, and no excess oil between layers. It is 58 in. long, with an initial diameter of 2½ in. and a maximum diameter of 8¾ in., measured over the final belt. Over 500 layers are required.

The stress cone is applied by hand over the machine-wound lower cone in such a way as to eliminate voids between metal and paper. Upper end of the cone terminates in a flux ring, which is covered with layers of varnished-cambric tape to reduce electric stress intensity. The completed stress cone is 12 in. long, the diameter increasing from that of the cable to a maximum of 6¼ in. High impulse strength of 1,000 kv indicates that this cable terminal can be applied with modifications to cable rated higher than 138 kv.

11 of the 16 largest turbine-generators*

use

GENERAL ELECTRIC ISOLATED PHASE BUS RUNS



RATINGS
15 and 23 kv
1200 to 7000 amperes

BECAUSE General Electric isolated-phase bus runs are dust-tight and weathertight, and maintenance costs are thus reduced.

BECAUSE the gasketed, hinged covers can be opened from either side. This feature cuts inspection time and costs by allowing access to the interior of the run from the most convenient position. Cover lugs release the cover without removal of bolts. The cover is swung open on either one of two sets of hinges.

BECAUSE you receive G-E isolated-phase bus runs completely assembled as a three-phase package, including running ground bus. They are installed in a short time at lower predictable costs.

BECAUSE you have one source of responsibility when you order from General Electric—complete co-ordination between planning, engineering, manufacturing, and service facilities to give maximum savings efficiency to the customer.

Your G-E Sales Representative has complete information about isolated-phase bus runs. Ask him for a copy of GEA-5460, a 28-page publication that will aid you in planning your bus runs, or write to *Apparatus Department, General Electric Company, Schenectady 5, New York.*

*Installed and planned, rated 6000 amperes and over.

GENERAL ELECTRIC

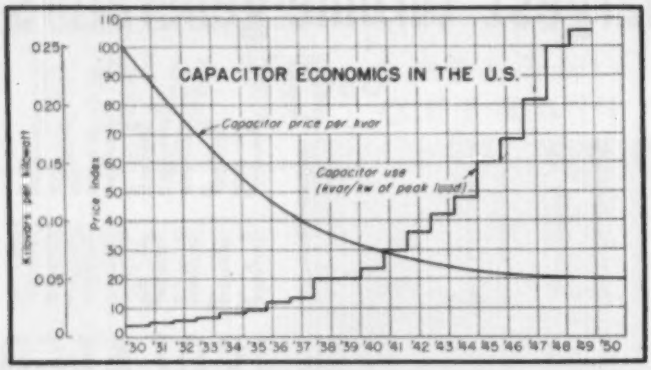

CAPACITOR ECONOMICS IN THE U.S.
Capacitor price per kvar
Capacitor use (kvar/kw of peak load)
Kilovars per kilowatt
Price index
'30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49 '50

FIG 1—PRICE PER KVAR of power factor capacity has been continuously reduced from 1930 to 1950. These capacitors include central station and industrial types but not small units sold with motors or fluorescent ballasts. Dollar cost per capacitor in 1930 = 100

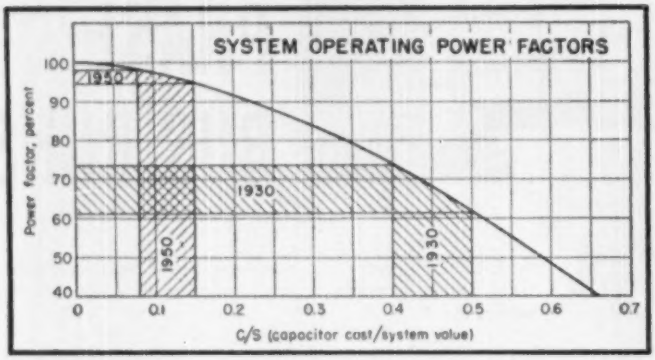


FIG 2—ECONOMIC operating power factor curve shows comparison of values in 1950 with those in 1930. System power factors today range from 95 to 98% compared to a range of 60 to 70% in 1930. Capacitor prices today make higher system power factors more attractive

Why Have Capacitor Economics Changed?

A. E. PELTOSALO
Transformer and Allied Products Div
General Electric Co
Pittsfield, Mass.

WHY HAS the philosophy of kilovar (reactive power) generation by means of shunt capacitors changed so radically in the last 20 years? In 1930 it was common practice to supply from central station generators not only kilowatts, but also kilovars. System power factors were low, with generators furnishing nearly 1 kvar for every kilowatt.

Today, the trend is toward generation of kilovars in the load area. For comparison purposes the relation of capacitors installed to system peak is very convenient, as it quickly indicates the relative amount of load area generation of kilovars by means of capacitors. Figure 1 shows that in the United States there was 1 capacitor kvar installed for approximately every 100 kw of system peak load in 1930. In 1948, there was 1 capacitor kvar installed for approximately every 4 kw of system peak, an increase of 2,500%.

Comparing the two curves of Fig 1, one can see how the lowering price of capacitors has affected their usage. It is of interest to note that the continual reduction in capacitor price is in sharp contrast to price trends of most other system equipment.

It has been shown[1], that if the usage of system capacity by kilovars is allocated on the basis of its use of system kilowatt capacity, the economical operating power factor will equal:

$$\frac{1-(C/S)^2}{1+(C/S)^2}$$

where

S = cost of system in dollars per kilowatt for that portion of the system which is operating at its thermal limit,

C = cost of capacitors in dollars per kilovar. A plot of this relationship is shown in Fig 2.

This type of analysis, from an over-all system standpoint, clearly shows the difference in today's economies with those which in 1930 were:

C = $28 (utilities were able to supply kilovars in the load area for approximately this price.)

S = $60 (for purpose of this article, $60 has been used for 1930 as well as 1950. Any particular system should substitute its own values to obtain a proper comparison.)

C/S = .467 (which gives an economical operating power factor of 64%.)

Twenty years ago systems were actually operating with power factors as low as these. Factoring the 1930 costs of capacitors plus system investments, it is seen that, by means of Fig 2, the economical operating power factors were in the range of 60 to 70%.

Today, with the advent of the reliable low-cost capacitors, the entire philosophy of kilovar generation has changed. Because of the independent low-cost kilovar generator (shunt capacitor) now available, plus the increased cost of other system equipment, it is present practice to generate a good portion of the kilovars in the load area and control these kilovars according to system requirements.

Fig 2 shows that when 1950 costs of capacitors and systems are plotted, economical operating power factors in the range of 95 to 98% proceed from these economies:

C = $8 (kilovars can be supplied in load area for approximately this price.)

S = $60 (conservative cost of substation investment through which kilovars flow during peak load.)

C/S = .133 (which gives an economical operating power factor of 96%.)

With the attractive economies of

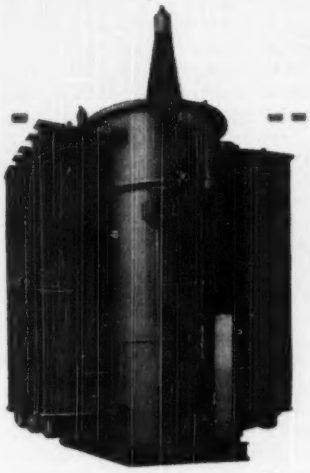
For Better Performance

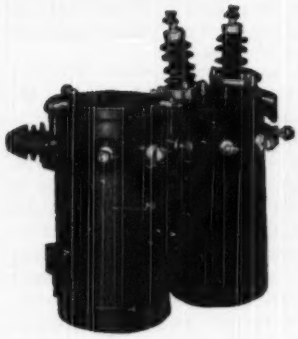
specify

MOLONEY TRANSFORMERS

***...less* maintenance expense...*longer* life...**

***better* performance proved by operating records!**





POWER TRANSFORMERS

Research, with our 2,500,000 volt Surge Generator playing an important part, together with 50 years experience in the *exclusive* manufacture of transformers is responsible for the fine operating records users are experiencing with Moloney Power Transformers.

Modern design, workmen of long experience, highest grade material and adequate processing facilities are combined to produce these transformers.

DISTRIBUTION TRANSFORMERS

Moloney HiperCore Distribution Transformers are widely used on utility distribution systems and in industrial lighting and power applications. Here too, Moloney's engineering and research have combined to make a superior product to fit your needs. Moloney Distribution Transformers are available in capacities from 3 to 500 Kva, in voltages up to 66,000 volts.

MOLONEY PRODUCTS

- Power Transformers
- Unit Substations
- Load Ratio Control Transformers
- Step Voltage Regulators
- Regulating Transformers
- HiperCore Distribution Transformers (Conventional and CSP Types)
- Load Center Transformers
- Askarel (Non-Inflammable Liquid) Cooled Transformers
- Air-Cooled (Class A and Class B Insulated) Transformers
- Constant Current Street Lighting Transformers (Conventional and Packaged Unit Types)
- Submersible Type Transformers
- Network Transformers
- Capacitors

Sales Offices in all Principal Cities

MOLONEY ELECTRIC CO.

FACTORIES AT ST. LOUIS, MISSOURI

AND TORONTO, ONTARIO, CANADA

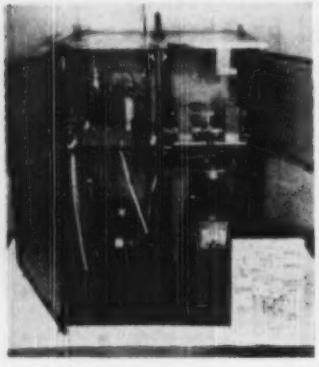
correcting to 95 to 98% power factor, it is common practice today to use not only permanently connected capacitors to take care of not only minimum or base requirements, but also to use switched capacitors to furnish regulated kilovars during peak periods.

Tomorrow's economies show every indication that ratios will be more nearly in the order of 1 capacitor kvar for every 3 kw of peak load or 1 capacitor kvar for every 2 kw of the peak load.

Reference 1: *The Economics of Using Capacitors in Amounts to Require Automatic Switching* by J. W. Butler, AIEE Technical Paper 47-55, December 1946.

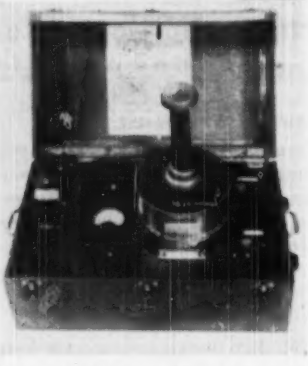
Three Units Used to Locate Cable Faults

A LONG STANDING NEED for satisfactory devices to determine the locations of cable faults was met by the Toledo Edison Co in 1945 by the development of three basically different types of testing equipment and accessories.



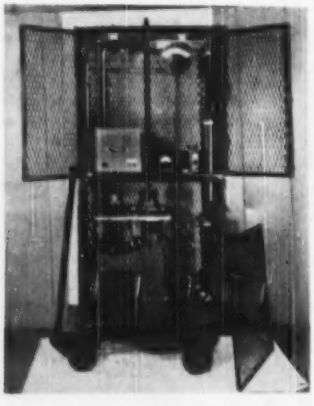
SURGE DISCHARGE UNIT has a 1½-kva, 115/7200-v transformer, a kenetron rectifier, a standard distribution type shunt capacitor and a variable spark gap. This variable spark gap serves to control peak voltage on capacitor and frequency of discharge

Surge Discharge Unit—Three uses: (1) Reduction of high resistance faults by application of steep wave front discharges; (2) generating "crackle" audible in a manhole or duct entrance or, in the case of buried cable, by a stethoscope pick-up above ground; and (3) supplying high voltage steady dc for a power bridge. Comprises a 1½-kva, 115/7,200-v transformer, a kenetron rectifier, a standard distribution type shunt capacitor and a variable spark gap to control the peak voltage on the capacitor and the frequency of discharge.

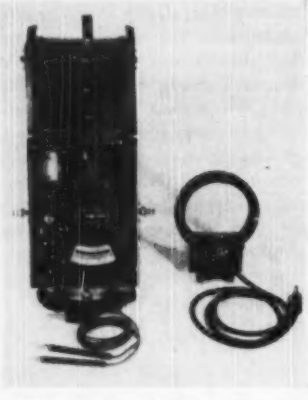


POWER BRIDGE consists of Wheatstone bridge arranged for a Murray loop test, with bridge calibrated in percentage distance to the fault. It is for use where the fault resistance is not too high. Unit is very accurate and saves much time in locating fault

Power Bridge—For making quick approximation of distance to the fault where the resistance of the fault is not unduly high, and where one unfaulted conductor is available to complete the bridge circuit. Consists of Wheatstone bridge arranged for a Murray loop test, with the bridge calibrated in percentage distance to the fault. The kenetron rectifier supplies approximately 10,000 v peak to the bridge arms. This unit has been found to be very accurate and has saved much time in the location of faults.

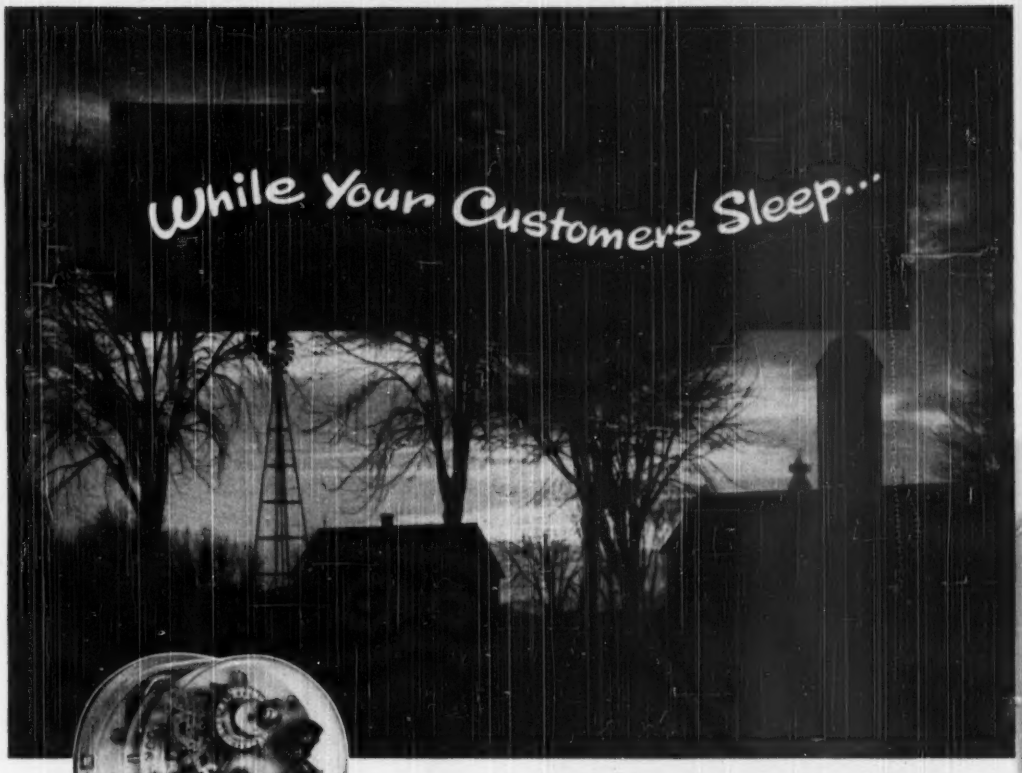


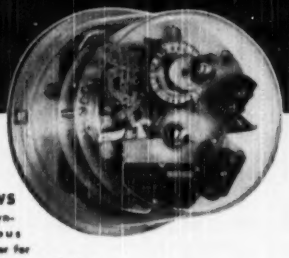
THYRATRON FAULT LOCATOR is applied to any cable where it is accessible for picking up the tracing signal inductively or for determining its polarity as it flows along the cable sheath. Accessories used with this locator are pick-up coil or prods and leads



ACCESSORIES for thyratron fault locator consist of pick-up coil to register inductive effect of applying and interrupting tracing current also set of prods and leads for measuring on galvanometer polarity of voltage drop caused by tracing current in sheath

Interrupted High Voltage DC Tracing Set—Known as a Thyraton Fault Locator, the set is applied to any cable (other than submarine cable) where the cable is, or can be made, accessible for picking up the tracing signal inductively, or for determining its polarity as it flows along the cable sheath. Consists of three units: (1) A specially designed constant current transformer, a thyratron rectifier, and control accessories for producing an interrupted direct current signal; (2) a pick-up coil to register on a zero-centered galvanometer the inductive effect of applying and interrupting the tracing current; and (3) a set of prods and leads for measuring on the galvanometer the polarity of the voltage drop caused by the tracing current flowing in the cable sheath.





Type WS
With Synchronous Carryover for Socket Mounting Outdoors

YOU CAN REDUCE SYSTEM PEAK DEMANDS WITH SANGAMO CONTROL OF WATER HEATERS AND OTHER DEFERABLE LOADS

Reductions in system peak demand of 500 watts per heater have been shown by recent field tests made for a large group of water heater consumers, using Sangamo Time Switches for "off-peak" control. This is typical of the results realized when water heater loads are transferred to "off-peak" hours by time controls where system peaks follow a set time schedule. Reduced demands mean savings on investment in system capacity. These proven savings with time control will pay for the switches in less than two years.

Sangamo's complete line of time switches meet all time control requirements for water heaters and other deferable loads. Where switching programs are to be repetitive on a fixed daily schedule only, the Type MS, for socket mounting, offers the maximum in economy. The Type JMS is a convenient, economical combination time switch and watthour meter for "off-peak" control and billing of water heating consumption at a special "off-peak" rate. Where required, the Type LS provides automatic omission or time change in the daily switching schedule.

In rural service, the Sangamo Type W line of Carryover Time Switches have proven most practical and economical for "off-peak" electric water heating control. Sangamo Carryover Time Switches have a ten-hour, spring-wound clock mechanism which drives the time dial during current interruptions. The reserve feature makes it unnecessary to reset the time dial after power failures up to ten hours. When power is restored, the synchronous motor which normally drives the time dial also rewinds the spring to make ready for the next outage. The transfer between motor and spring drive is automatic.

Other types of switches are available from Sangamo's complete line of time controls, offering you a wide choice of devices for any peak demand control application. For convenient installation these switches are available in either socket, nipple (for attaching to knockout on meter service cabinet) or rectangular case types.

Catalog 1010 gives full information. Write for your copy.

P1050-11A

Type W
With Synchronous Carryover for Panel Mounting Indoors

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Type JMS
Combination Meter-Time Switch

Transformer Capacity Determined For Series Street Lamps

Tables aid in determining the size of constant current transformer required for circuits of series incandescent filament lamps. Values are based on 600 ft of wire per lamp, different sizes of wire, and circuit ratings of both 6.6 and 7.5 amp. Data are adapted from standards of Consumers Power Co

TABLE I—Maximum Lamp Load on Constant Current Transformers

Type RO Transf., kw	Lamp Size, Lumens	Number of Series Lamps on a Circuit							
		6.6 Amp Circuits				7.5 Amp Circuits			
		No. 8 Wire		No. 6 Wire		No. 8 Wire		No. 6 Wire	
		Straight Series	Ins Transf	Straight Series	Ins Transf	Straight Series	Ins Transf	Straight Series	Ins Transf
5	1,000	60	...	65	...	57	...	62	...
	2,500	29	...	30	...	28	...	30	...
	6,000	...	12	...	12	...	11	...	11
	10,000	...	7	...	7	...	7	...	7
7½	1,000	90	...	98	...	85	...	94	...
	2,500	44	...	46	...	43	...	45	...
	6,000	...	17	...	18	...	17	...	18
	10,000	...	10	...	10	...	10	...	10
10	1,000	121	...	131	...	114	...	125	...
	2,500	59	...	61	...	57	...	60	...
	6,000	...	24	...	24	...	23	...	24
	10,000	...	14	...	14	...	14	...	14
15	1,000	181	...	197	...	171	...	188	...
	2,500	88	...	92	...	86	...	90	...
	6,000	...	36	...	36	...	35	...	36
	10,000	...	21	...	21	...	21	...	21
30	1,000	364	...	394	...	343	...	377	...
	2,500	177	...	184	...	172	...	180	...
	6,000	...	72	...	73	...	71	...	72
	10,000	...	42	...	42	...	42	...	42
40	1,000	485	...	526	...	457	...	503	...
	2,500	236	...	245	...	230	...	241	...
	6,000	...	95	...	97	...	94	...	96
	10,000	...	56	...	57	...	56	...	56
50	1,000	606	...	657	...	572	...	628	...
	2,500	296	...	307	...	287	...	301	...
	6,000	...	120	...	122	...	118	...	120
	10,000	...	70	...	71	...	70	...	71

TABLE II—Transformer Capacity Required Per Lamp, Series Incandescent Filament Lamps

Lamp Lumens	Circuit Amp	Wire Size, Awg	Transformer Capacity, Kw	
			Straight Series Group RP Lamps	Type IL or Autotransf Group RP Lamps
1,000	6.6	6	0.0160	.....
1,000	6.6	8	0.0893	.....
1,000	6.6	10	0.0999	.....
1,000	7.5	6	0.0795	.....
1,000	7.5	8	0.0874	.....
1,000	7.5	10	0.1013	.....
2,500	6.6	6	0.163	.....
2,500	6.6	8	0.169	.....
2,500	6.6	10	0.180	.....
2,500	7.5	6	0.166	.....
2,500	7.5	8	0.174	.....
2,500	7.5	10	0.188	.....
4,000	6.6	6	.....	0.292
4,000	6.6	8	.....	0.298
4,000	6.6	10	.....	0.309
4,000	7.5	6	.....	0.295
4,000	7.5	8	.....	0.303
4,000	7.5	10	.....	0.317
6,000	6.6	6	.....	0.410
6,000	6.6	8	.....	0.417
6,000	6.6	10	.....	0.428
6,000	7.5	6	.....	0.415
6,000	7.5	8	.....	0.422
6,000	7.5	10	.....	0.437
10,000	6.6	6	.....	0.701
10,000	6.6	8	.....	0.707
10,000	6.6	10	.....	0.718
10,000	7.5	6	.....	0.704
10,000	7.5	8	.....	0.712
10,000	7.5	10	.....	0.726

IN THE DESIGN of a series street lighting circuit the total load must be limited to the kw rating of the constant current transformer, which has little, if any, inherent overload capacity.

Table I shows the maximum number or lamps of a specific size and current rating that can be connected to each kw rating of transformer. This table is most convenient where all lamps on a given circuit are of the same size.

Table II can be used when lamps of more than one size are to be connected in a single circuit.

Transformer capacities determined from these tables are based on use of group replacement series lamps. Manufacturer's data (G.E. Co) rate these lamps at 3,000 laboratory hours with a recommended service life of 2,400 hr.

For series street lighting circuits of 6.6 to 7.5 amp, No. 6 copper wire for overhead conductors is recommended, based on strength requirements and for underground, a minimum of No. 8 copper cable is recommended for current carrying capacity requirements. For lamps served from insulating transformers, a minimum of No. 8 copper wire (Type M cable) is recommended for the leads between transformer and lamp.

Example

Assume a 6.6 amp series street lighting circuit with 40 2,500-lumen lamps of the straight series type and 8 6,000-lumen lamps with insulating (IL) transformers. Circuit wire size is No. 6 with approximately 600 ft of circuit (one wire) per lamp.

1. From Table II, the lamp factor for a 2,500 lumen straight series lamp, 6.6 amp circuit with 600 ft of No. 6 wire per lamp is 0.163. Likewise, the lamp factor for a 6,000-lumen lamp with insulating transformer and the same circuit characteristics is 0.410.

2. Total kw of load is $(40 \times 0.163) + (8 \times 0.410) = 6.52 + 3.28 = 9.8$ kw.

3. Calculated load of 9.8 kw indicates that the standard size constant current transformer to be chosen is 10 kw.

4. If the calculated kw of lamp load is more than the capacity of the largest transformer available, divide the lamp load between two or more circuits in such a manner that standard transformers can be properly utilized. For example, with a load requirement of 37 kw, three circuits might be used, two of 15 kw each with the third circuit having a 7½-kw transformer. Other combinations of circuit and transformer loads are possible, but it is recommended that new series circuits be designed so that the load can be served from a 15 kw or smaller constant current transformer. In the smaller ratings, lower open-circuit voltage stresses are impressed on any cable. Safer operating conditions result, and the area affected for the duration of an outage is reduced.

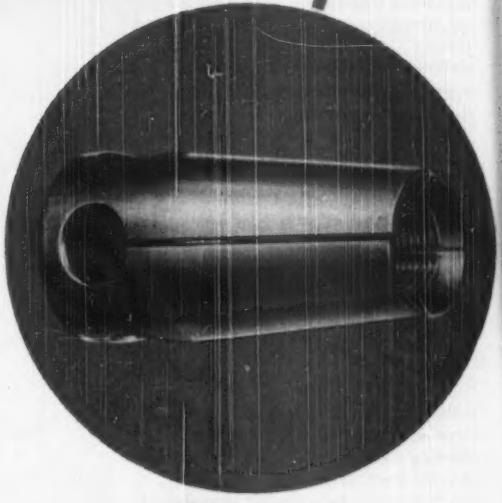
It's This "One-Piece" Jaw---

And Here's Why:

- Precision machining of the "one-piece" jaw from solid bar stock assures *permanent alignment* of jaw segments, which prevents individual strands of the conductor from getting out of place.
- Because of "one-piece" construction, jaw segments flair out slightly as the wire is inserted to give an excellent initial grip on the wire.
- The entire jaw assembly and conductor move forward as a unit when tension is applied to complete the grip—so it can't let go!
- The "one-piece" jaw permits a liberal safety zone to be machined into the back of the jaw to accommodate burred ends of the conductor.
- The "one-piece" jaw is made of durable "Duronze," with sharply machined teeth that give a strong, corrosion-resisting bite on the conductor.

•

Fargo Automatic Line Splices . . . Reducing Splices . . . and Dead Ends are available in sizes from #8 solid to 500MCM. Your Line Material sales representative will be glad to give you complete details on these and other Fargo Devices.



FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N.Y.

Distributed by
LINE MATERIAL COMPANY
Milwaukee, Wisconsin

LM

Electrical Steel Sheets Interlamination Resistance

Chart gives relation of interlamination resistance to pressure for several grades of steel sheets; an adaptation from engineering manual of Carnegie-Illinois Steel Corp

INTERLAMINATION RESISTANCE is the electrical resistance measured in the direction perpendicular to the plane of lamination in a stack of laminations. The control of this resistance is important in large transformers and rotating machines.

The value of interlamination resistance can be controlled either by the sheet surface oxide or by mechanical separating mediums such as core plating (varnishes, etc). Core plate used with the surface oxides provides a good physical and electrical isolation of adjacent laminations over a wide range of pressures and eddy current potentials.

Three types of core plating are:

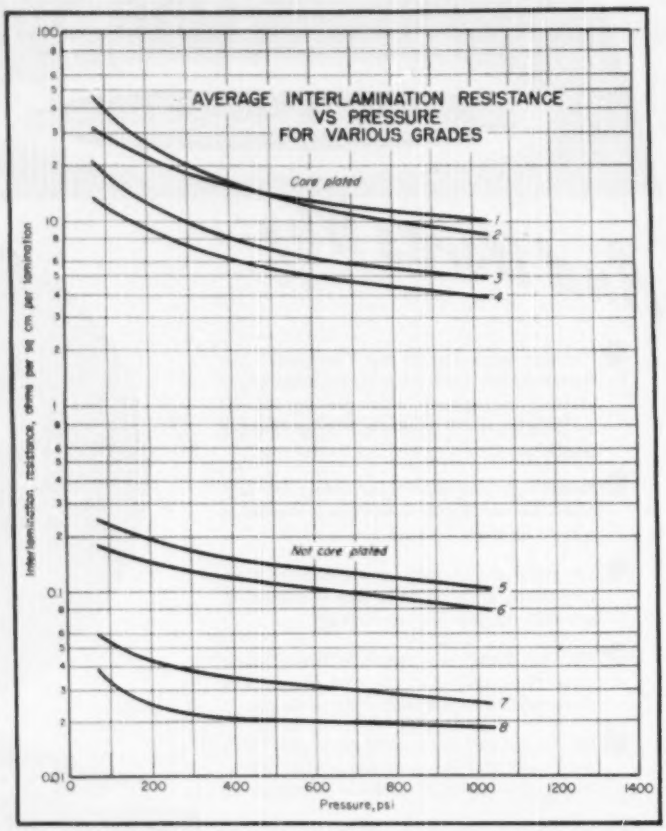
No. 1—This type is heat and oil resistant, withstanding the usual conditions found in air-cooled (not oil immersed) cores, such as for motors, generators and air cooled transformers and equipment not immersed in oil.

No. 2—This type is heat and oil resistant and will withstand temperatures up to about 1,500 F, thereby allowing laminations punched or sheared from sheets coated with this No. 2 type of plating to be annealed after punching.

No. 3—This type is a high quality varnish, being oil and heat resistant. It is primarily applied to laminations used in oil immersed coils for power and distribution transformers.

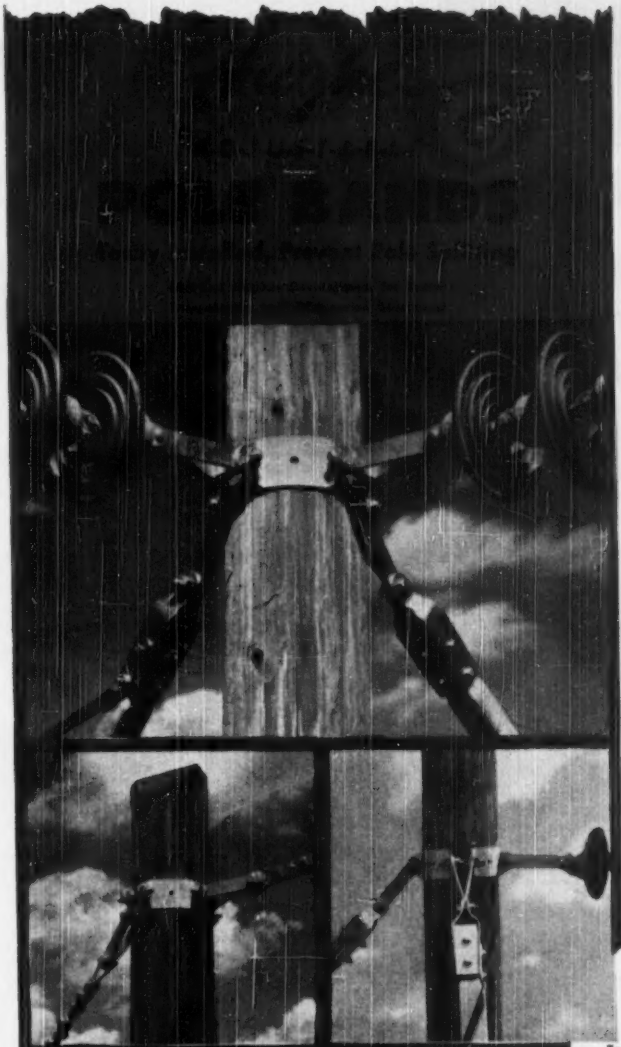
The core plating is flashed and then baked on the sheets.

Thickness of the core plating can be controlled to some extent, but in general the thickness is such that the space factor is reduced about 1%.



AVERAGE INTERLAMINATION RESISTANCE versus pressure for following grades of electrical steel sheets, core plated and not core plated; tested in accordance with ASTM Standard Methods A-34, latest issue:

(1) USS Transformer 58 and 52, core plated No. 2 or 3
(2) USS Transformer 72 and Dynamo, core plated No. 1 or 3
(3) USS Motor, core plated No. 1 or 3
(4) USS Electrical and Armature, core plated No. 1 or 3
(5) USS Transformer 58 and 52, not core plated
(6) USS Transformer 72 and Dynamo, not core plated
(7) USS Motor, not core plated
(8) USS Electrical and Armature, not core plated



Popular and logical members of the extensive family of Hughes line construction accessories are the Pole Bands. Used on wood poles for guy and insulator attachments, they are designed for almost any combination of angles. They are easily installed, and easily adjustable to varying pole sizes. Extremely flexible in application, they may be used with Hughes connecting links and wood strain guy insulators attached to any or all sides. Hughes Pole Bands are made in standard and heavy-duty types, the latter for exceptionally heavy conductor loads. For special pole band requirements, or extra heavy dead ending, write our Engineering Department.

Manufacturers of

Transmission and Distribution Structures • Transmission Line Hardware • Prefabricated Wood Substations • Transformer Platforms • Wood Buyonets • Special Wood and Steel Items.

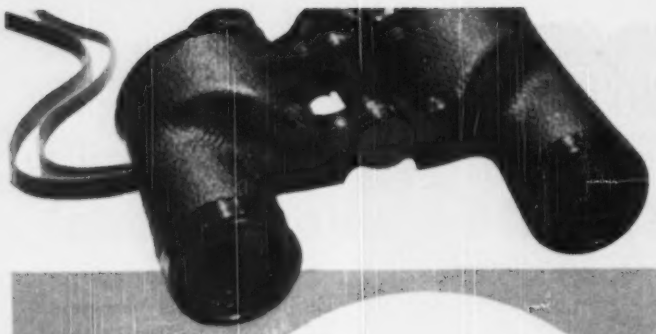
WHEN IT'S HUGHES *It's Tailored* TO YOUR NEEDS

HUGHES BROTHERS

SEWARD NEBRASKA

FOUNDED - 1921 INCORPORATED

HUGHES TRANSMISSION & DISTRIBUTION MATERIAL MEN



See how WITH THESE

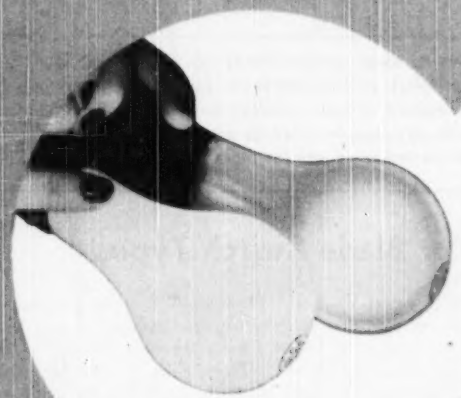
1. NEW GENERAL ELECTRIC 50-GA LAMP dresses up chandeliers and ceiling rosettes. Directs part of the light upward —part downward. Tinted enamel coating on under portion mellows the light to flatter surroundings.

3. ANOTHER NEW ALL-OVER-BRIGHT LAMP is the new G-E indirect-lite lamp. Gives balance of upward and downward light. Available in 150-watt size and 50-100-150-watt 3-lite. Like the 100-watt White lamp, it has the new kind of inside finish that gives near-perfect diffusion.

5. THE FOUR NEW G-E LAMPS shown here have all been introduced within the past two years. By constantly developing new and better lamps, General Electric helps make life brighter for everyone.

everyone Brightens Up

NEWEST GENERAL ELECTRIC LAMPS!



2. LIGHT IS SOFTER, MORE PLEASING

with General Electric's new White lamp bulb that's all-over bright. 100-watts. Will mean better lighting in your customers' homes. Photos show difference between White lamp (left) and standard lamp (right).

4. NEWEST IN FLUORESCENT,

G-E De Luxe fluorescent lamps bring out full beauty of all colors as fluorescent has never before been able to do. De Luxe fluorescent lamps flatter furnishings and complexions, are available in two types—Cool White and Warm White—to give choice of atmosphere.

GE LAMPS

GENERAL ELECTRIC

Type of operation	Airbreak	Load break	Disconnecting							
			Single throw	Single set double throw	Two blade double throw 180-deg travel	Two blade 90-deg travel	Two blade 90-deg travel, one blade hinged at end	Fuse or "Cutout"	Two sets group operated	By-pass
Stick										
Gang	Hinge									
Motor	Hinge			Symbols for blade switches used by New England Electric System follow ASA standards but have a few additions. Note indication of hinge location on airbreak switch symbols and treatment of disconnecting two-blade set-up with 90-deg travel and one blade hinged at the end						
Automatic	Hinge									

Convenient Symbols for Blade Switch Types

NEW ENGLAND ELECTRIC SYSTEM'S standard symbols for blade switches employ compact single-line layouts which take little time to sketch. These are free from complications and are readily understood by operators and draftsmen.

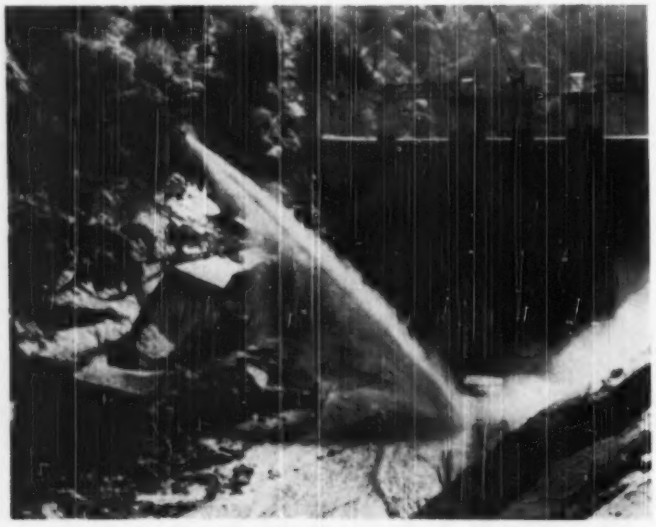
To an extent they parallel ASA symbols, but without known conflict. In some cases they enlarge upon the switch functions identified by ASA.

Thus, in the accompanying illustration those for airbreak switches are set up to indicate the hinge location, an added safety feature. The diagram for a disconnecting two-blade installation with 90-deg travel is slightly different from the ASA symbol. The one for a disconnecting two-blade set-up with 90-deg travel and one blade hinged at the end is believed to represent an added standard symbol. The same applies to the symbol for the disconnecting bypass.

• • •

Hydraulic Monitors Free Sluice Gates of Debris

H. H. WHEELER, Jr.
Southern California Edison Co
Big Creek, Calif.



CLEANING of clogged sluice gates is much easier after logs and debris have been loosened by hydraulic monitors installed at small reservoir. Monitors also break up sand bars and aid in periodic sluicing which keeps sand passing through turbine intake to a minimum

TWO HYDRAULIC MONITORS are used at a small reservoir of Southern California Edison Co to blast sand away from logs and debris lodged against sluice gate trash racks. Clogging material can then be removed easily from the rack with a revolving hoist, a job that formerly required hours of difficult and hazardous work.

The reservoir is sluiced periodically to keep precipitated sand bars well below the bottom of the tunnel intake and to prevent passage of excessive quantities of sand through the turbines. Before the monitor installation, sluicing operations were long and tedious and their success was dependent on natural stream flow action, meagerly aided by fire hose and extensive manpower.

Two monitors are located above the dam, one on each bank, so that sluice

HI-TENSION NEWS *Junior*

YOU, TOO, CAN *forget* ABOUT INSULATORS

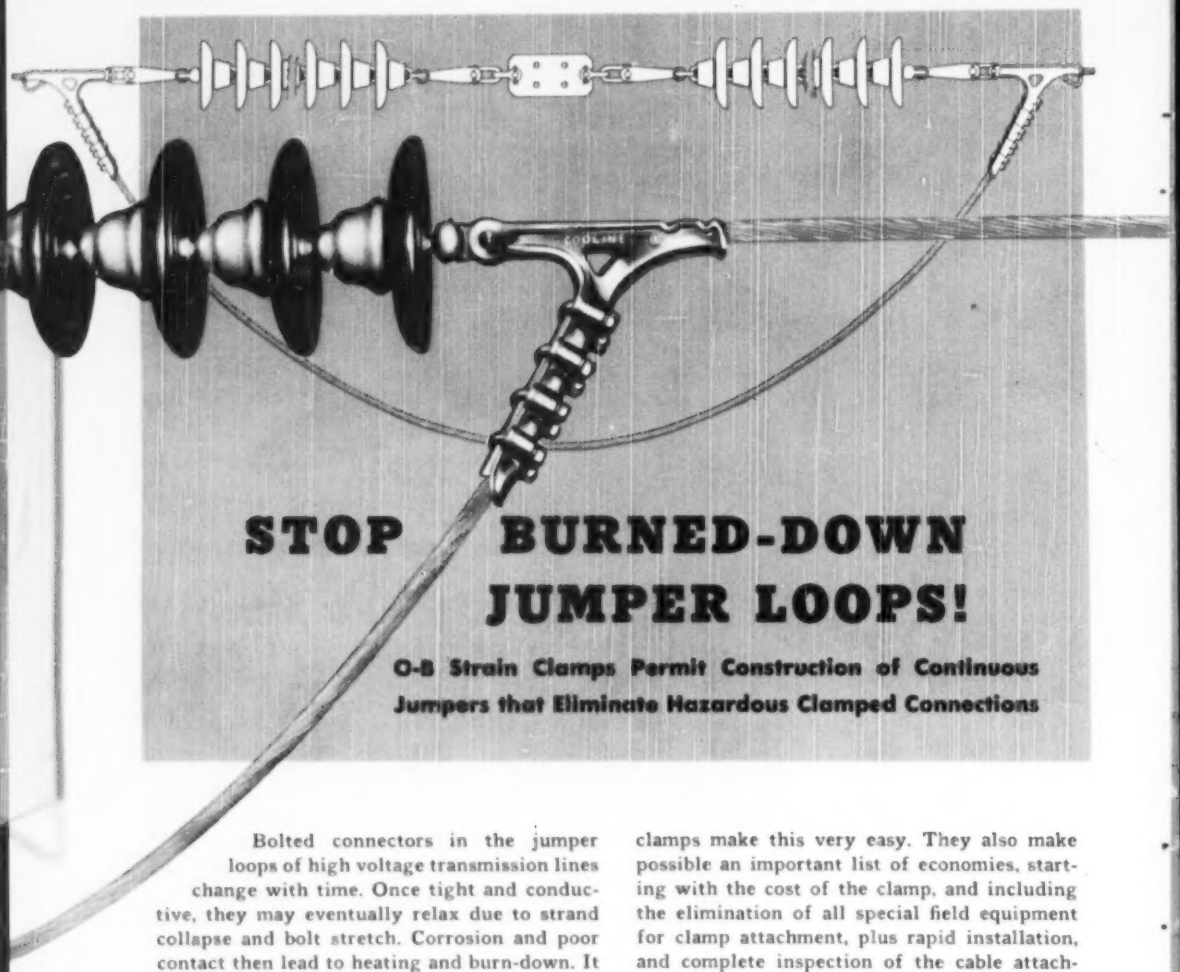
In 1922, when O-B suspension insulators were placed in service on this 110-kv line, someone may have wondered, "How good are they?". It's been 28 years since such a question could have been asked—they know! In all the 28 years these insulators have served, they have shown the happy faculty of never calling attention to themselves. What more can you ask of an insulator?

If you, too, would like to have insulator troubles off your mind for 20, 30, or more years to come, specify O-B—the kind you can install and then forget!

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*



STOP BURNED-DOWN JUMPER LOOPS!

O-B Strain Clamps Permit Construction of Continuous Jumpers that Eliminate Hazardous Clamped Connections

Bolted connectors in the jumper loops of high voltage transmission lines change with time. Once tight and conductive, they may eventually relax due to strand collapse and bolt stretch. Corrosion and poor contact then lead to heating and burn-down. It is the reported experience of power companies the country over!

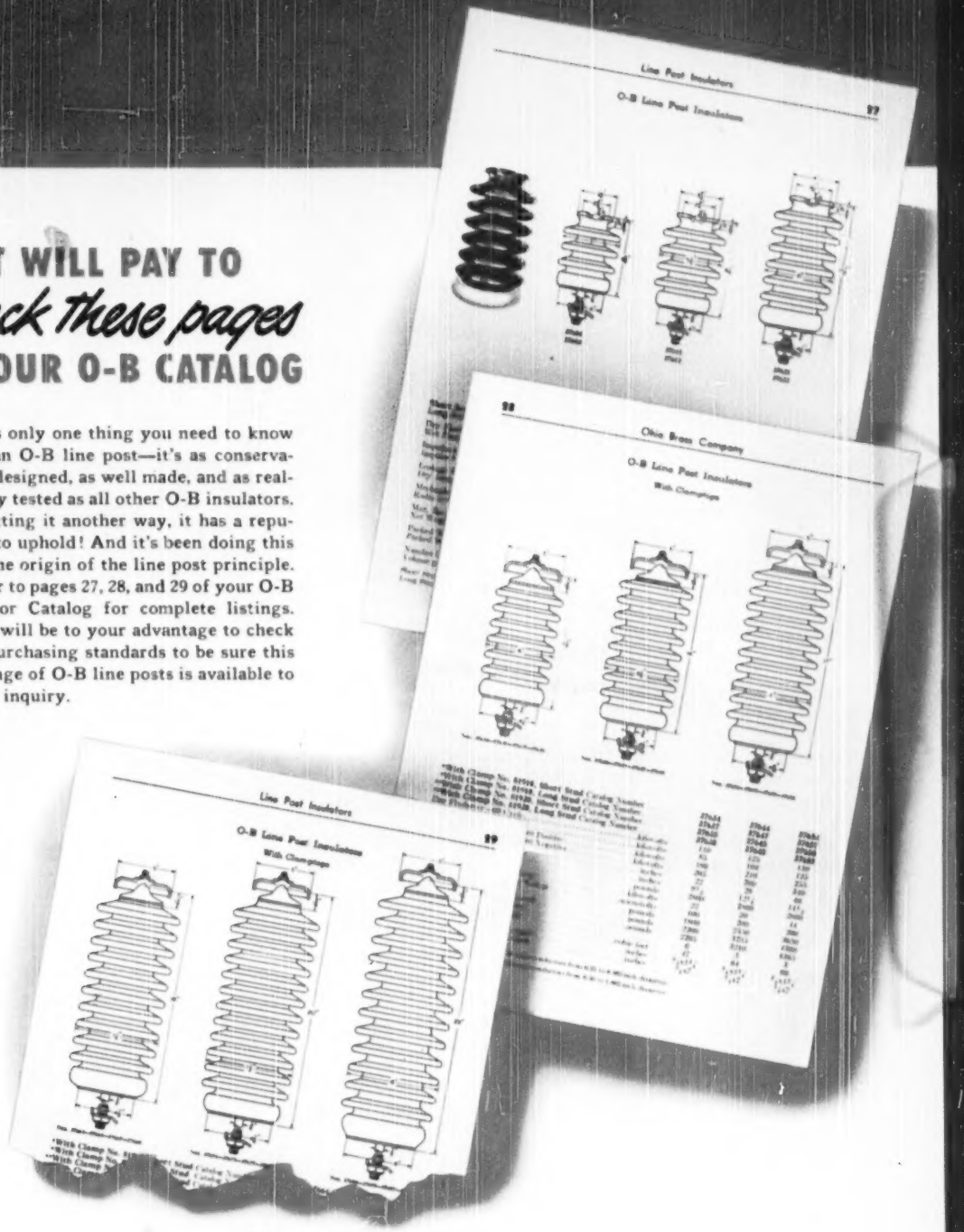
Eliminate this splice trouble in the simplest, surest way—by eliminating the splice itself. This is done by stringing through all deadend points with a continuous conductor. O-B strain clamps make this very easy. They also make possible an important list of economies, starting with the cost of the clamp, and including the elimination of all special field equipment for clamp attachment, plus rapid installation, and complete inspection of the cable attachment during construction or at any later time.

With a lower first cost from many angles, you gain the added advantage of unspliced jumper loops—with the elimination of their serious troubles—when you specify O-B strain clamps on your new transmission line construction.

IT WILL PAY TO *check these pages* IN YOUR O-B CATALOG

There's only one thing you need to know about an O-B line post—it's as conservatively designed, as well made, and as realistically tested as all other O-B insulators. Or, putting it another way, it has a reputation to uphold! And it's been doing this since the origin of the line post principle.

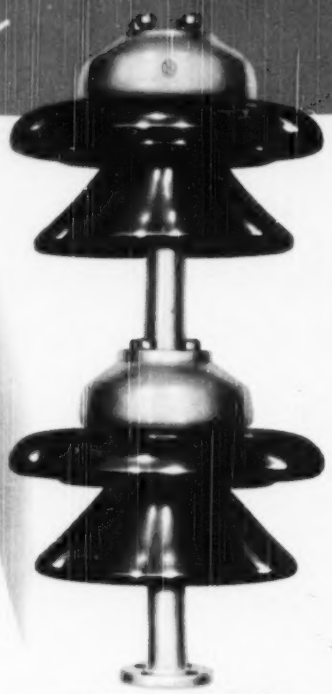
Refer to pages 27, 28, and 29 of your O-B Insulator Catalog for complete listings. And it will be to your advantage to check your purchasing standards to be sure this full range of O-B line posts is available to you on inquiry.



Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

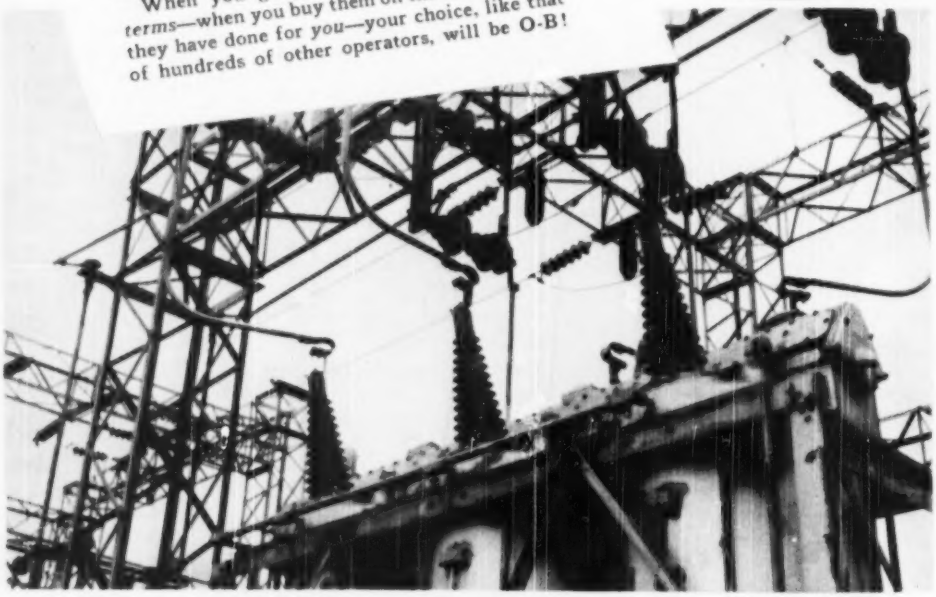


The Soundest Gauge of an Insulator

WHAT IT HAS DONE FOR YOU!

Twenty-seven years ago, a prominent power company installed these O-B station insulators to serve an extremely vital industrial load. How well have they done it? Here's the most concrete answer. Right up to the present this company is a consistent O-B user. It would only come back for more of the same, when this "more of the same" consisted of reliability and satisfaction.

When you gauge insulators on *your own terms*—when you buy them on the basis of what they have done for *you*—your choice, like that of hundreds of other operators, will be O-B!



Ohio Brass

MANSFIELD, OHIO, U.S.A.

3041-H

gate and tunnel intake trash racks are within their range. The monitors use penstock water at a nozzle pressure of 220 psi with a flow of 21 cfs. Each monitor gives a stream of water 5 in. in diameter with an impact of over three tons. This jet can move considerable material at distances up to 100 yd, and is useful in washing down sand banks which the stream has cut through and left standing.

During recent sluicing operations the monitors facilitated removal of approximately 125 acre-ft of sand from the reservoir bottom, with a substantial saving of time and manpower compared to previous methods.

•

Transformer Leads Identified at Night

AN EASTERN UTILITY carries a 25- kva portable transformer on a truck to speed service restoration on its distribution system. The leads are more rapidly identified by painting the primary lead terminal red and the ground lead terminal white. This is especially valuable at night in replacing a small transformer exposed to a lightning storm. The possibility of making an incorrect connection in a relatively dark area is greatly reduced.

•

Tube Failures Reduced by Potassium Water Treatment

WHEN Consolidated Edison Co of New York Inc. started a new 1,600-psig, 950-F boiler at the Sherman Creek generating station it soon became evident that some change would have to be made if the boiler were to be maintained at full pressure and full rating for extended periods without high maintenance due to tube damage. It was discovered that the solubility characteristics of sodium salt were not as favorable to

"Automatic" AER-O-FOAM FOR INDUSTRY

Considered to be one of the foremost recent advancements in the science of fire protection, "Automatic" AER-O-FOAM has opened new avenues in fire safety which heretofore were not thought to be practical or economically feasible. Hazardous conditions familiar to chemical processing industries, metal working plants, petroleum storage and handling, electric power generation, and other occupancies where flammable liquids are involved, can now be fully safeguarded by engineered "Automatic" AER-O-FOAM protection.

A hydrolyzed protein, manufactured from a soya bean base, AER-O-FOAM, when mixed with water and aerated, forms a smothering tenacious blanket capable of flowing around obstacles. The system is set into operation "Automatically" through the quick response of highly sensitive Rate-of-temperature-Rise heat detectors and allows for the speedy extinguishment of fires involving gasoline, benzol, naphtha, and many other flammable liquids.

This form of protection also provides important engineering advantages evidenced in the improvement of drainage conditions, reduction of water supply requirements, non-corrosive action of the foam material and prevention of re-flash. As "Automatic" AER-O-FOAM dehydrates rapidly following application, clean-up operations are practically non-existent.

Better investigate the advantages of "Automatic" AER-O-FOAM protection for those stubborn fire areas in your plant. More detailed information is available through your nearest "Automatic" Sprinkler representative. He'll be happy to furnish you with surveys and estimates without cost or obligation. Write or call today.

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT . ENGINEERING MANUFACTURE . INSTALLATION
OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

Specify ACCURATE
FRICTION AND RUBBER
*ASTM TAPE

1. NATIONWIDE WAREHOUSE STOCKS FOR SERVICING EVERY LOCALITY
2. STRATEGICALLY LOCATED REPRESENTATIVES RENDER FAST, PERSONALIZED SERVICE

For SUPER SERVICE on tape . . . in any quantity, large or small, contact the nearest ACCURATE representative

★ California—F. J. AIREY COMPANY 1512-1515 S. Maine St. L. A.
★ California—WM. H. GRIBBLE Rm. 201, Pacific Building 610 16th St., Oakland
★ Georgia—L. MORRIS LANDERS CO. 913 Walton Bldg., Atlanta
★ Illinois—GEORGE BUTLER CO. 1015 W. Wash'gton Blvd., Chicago
Indiana—ARTHUR L. EHLERS CO. 2601 Ryan Drive, Indianapolis
Kentucky—ARTHUR L. EHLERS CO. 1914 Rutherford Ave., Louisville
Mass.—WALTER E. DAW ASSOC. 176 Federal Street, Boston

WAREHOUSE STOCKS and REPRESENTATIVES
Michigan—V. W. CROSS 5879 Ridgewood Ave., Detroit
New Jersey—ROBERT E. LAWTON P.O. Box 191, Cedar Grove
★ New York—ACCURATE MFG. CO. 44 Hopworth Place, Garfield
★ New York—WALTER E. DAW ASSOC. 1155 Oswego Blvd., Syracuse
N. C.—L. MORRIS LANDERS CO. 2809 Whiting Ave., Charlotte
★ Ohio—ARTHUR L. EHLERS CO. 49 Central Ave., Cincinnati

★ Ohio—THE OHIO RUBBER CO. 725 St. Clair Ave., Cleveland
Penn.—J. T. HEAGARTY & CO. Liberty Tr. Bldg., Philadelphia
Texas—WYNNE SMOOTS CO. 705 E. 13½ Avenue, Houston
★ Texas—WYNNE SMOOTS CO. 2nd Unit Santa Fe Bldg., Dallas
Virginia—W. E. EPPERSON 406 Travelers Bldg., Richmond
★ Washington—ELECTRIC AGENCIES 618 Second Ave., Seattle
Wisconsin—GEORGE BUTLER CO. 1015 W. Washington Blvd., Chicago

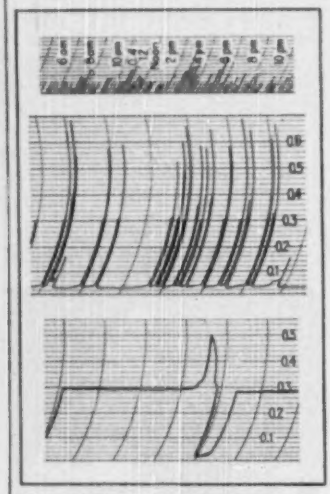
★ CONSIGNED STOCK

* ACCURATE SPECIFICATION TAPES—Rubber and Friction—exceed ASTM designations: D119-48T and D69-48T.

WRITE FOR FREE SIX PAGE FOLDER — Your copy is now ready. Fully describes the Accurate quality line of standard and specification friction and rubber tapes. Please write on company letterhead to ACCURATE MANUFACTURING CO., GARFIELD, N. J.

ACCURATE TAPE

operation in such boilers as the corresponding potassium salts. The boiler was cut over to potassium boiler water treatment with a considerable reduction in the number of tube failures as well as corresponding outages.



TOP—PORTION of a 15-min reset reactive kva (chart reading x 10) demand chart taken on a 220-v, 3-ph service where principal load is an elevator. It appears that a 3 or 4-kva, 230-v, 3-ph capacitor bank would counteract practically all reactive kva hours. **CENTER—PORTION** of a chart (speed—3 in. per hr) showing instantaneous demands of same reactive kva (chart reading x 50) elevator load shown in Fig 1, indicates that 3 or 4 kva correction is not sufficient, instead about 15 kva of capacitors would be required. **BOTTOM—CHART** made from meter that produced chart shown in Fig 2, except that it was stepped up from its regular speed of 3 in. an hour to 3 in. per min (reactive kva = chart reading x 50)

How to Select Capacitors For Fluctuating Loads

A. E. HUNTER
Power Engineer
Duquesne Light Co
Pittsburgh, Pa.

THE Duquesne Light Co uses an instantaneous type test meter set-up for making power factor surveys of customers whose predominating load consists of elevators, arc furnaces or any other equipment that imposes intermitten demands, demands which are of a relatively high value and short duration.

Most electric utilities set up their

rates to make it worthwhile for power customers to maintain a good average power factor. Ordinarily, when a company makes a power factor survey to estimate the prospecting saving that would accrue from power factor correction, several steps are taken: (1) Phasing transformers and a kwhr test meter with a chart type 15-min demand attachment are installed; (2) charts thus obtained are analyzed to determine the kva of correction required for adequate power factor improvement; (3) things that may be done to achieve the desired power factor betterment are examined; and (4) an estimate is made of the cost of suggested equipment and/or changes required.

Fluctuating Load

The above general procedure is followed regardless of the nature of the customer's operations. If, however, the customer's load is of a fluctuating nature, an instantaneous chart type test meter is used to obtain the kind of data necessary for the accurate sizing of corrective equipment. Accompanying charts illustrate an example taken from the files.

Top of figure shows a portion of a 15-min reactive kva demand chart taken on a 220-v, 3-ph service where the principal load is an elevator. It would appear that a 3 or 4-kva, 230 v, 3-ph capacitor bank would be sufficient to counteract practically all of the reactive kva hours. Center figure reproduces a portion of a chart showing instantaneous demands of the same reactive kva. Figure at bottom was obtained by the same instantaneous meter that produced the center chart except that the chart was stepped up from its regular speed of 3 in. an hour to 3 in. per min. It can be seen from lower two figures that 3 or 4 kva of correction would not be sufficient; instead about 15 kva would be required to accomplish the result that is desired.

The reason for the apparent discrepancy between the three figures lies in the fact that the kvahr created by this elevator (fluctuating load) consisted of relatively high peaks of a short duration with considerable intervals of inactivity. The graphic or instantaneous type meter recorded the peaks as they occurred, whereas the 15-min reset meter showed only the average rates at which the kvahr were created.

has all the advantages of the 8-ft. lamp—
but scaled down to human, handy size

Easier Service and Maintenance

ONE MAN... can carry it, relamp it
mount it, maneuver it

- No starters—no starter trouble
- Virtually same lumen output per foot as 8-ft. lamps
- Easier to store
- Safer—safety codes in large national organizations require 2 men to handle anything longer than a man's height

Available in every 2 or 4—40W fluorescent fixture in the complete GUTH line. For full details, call your nearest GUTH Resident Engineer or write today for Bulletin 871-H

Guth LIGHTING

THE EDWIN F. GUTH COMPANY / ST. LOUIS 3, MISSOURI

Leaders in Lighting since 1902

391

LOAD BUILDING

RESIDENTIAL • RURAL
COMMERCIAL • INDUSTRIAL

THE BUILDER of one group of "Sunshine Homes," S. N. Adams, left, points to sign featuring adequate wiring and proper lighting. Leon Shaver and Jack Moody of Houston Lighting & Power Co look on. In one week, 4,500 people visited homes open for inspection

New Homes Have Adequate Wiring, Proper Lighting

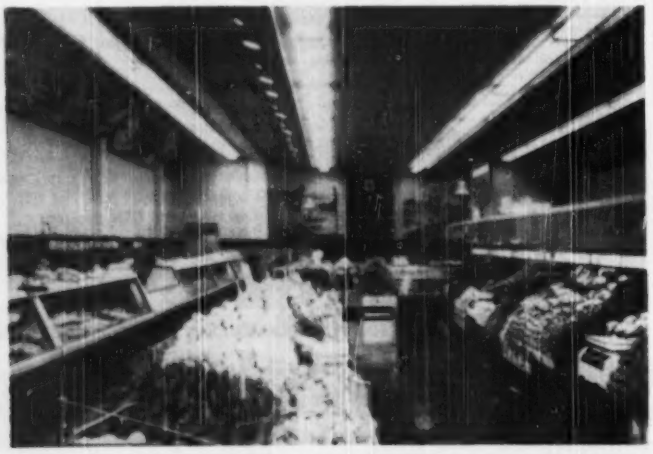
TWO BUILDING developments in widely separated sections of Houston (Tex.) are featuring "Adequate Wiring and Proper Lighting." They are promoted as "Sunshine Homes" and are equipped with all-electric kitchens that include ranges, refrigerators, dishwashers, and garbage disposers. They also feature electric laundry equipment.

One home in each development was set up for inspection for a period of one week. A total of 4,500 people visited them during this period. Each incorporated all of the latest improvements in sight-saving lighting fixtures. They demonstrated that good lighting is not only utilitarian, but can be beautiful as well. Proper fixtures for general lighting were installed in all rooms of the homes and lighting for convenience and safety was used in hallways, in the garage, at front and back entrances, in closets and above all working surfaces in the utility rooms and kitchens. Numerous portable lamps, together with cove and valance lighting added beauty and eye comfort to the homes.

Houston Lighting & Power Co cooperated with builders in this promotion. The company assisted in every way possible in working out plans and also helped in advertising and handling "open house" periods for each development. The company placed red and black cards, about 6½ in. square, above the baseboard at range outlets in all homes built for sale. "Not just an ordinary 'plug'," the card reads. "This kitchen is wired for cool, clean electric cooking."

Fluorescents and Incandescents Relight Food Market

C. L. DALY
and
C. M. J. WOOD
Pacific Gas & Electric Co
San Francisco, Calif.



MODERNIZED LIGHTING rejuvenates food market, makes murals on upper walls apparent

PLANNED LIGHTING was installed some 13 years ago in Romey's neighborhood food market when it was built. Approximately 60 200-w mirrored glass recessed reflectors were used. In the center of the room was a large glass ceiling-sash furnishing abundant natural light. In time, annoyance from skylight glare and heat caused the owner to paint out the glass to match the ceiling. This corrected the trouble, but the market looked dark, more and more so as

This installation was a winner in the 1949 General Electric Planned Lighting Competition

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Now... current transformers that match switchgear ratings!

Just read the nameplate to find the continuous rating of the new current transformers now installed in Westinghouse Metal-Clad Switchgear. There's no need to derate in accordance with ambient temperature.

In accordance with A.S.A. Standards, current transformers are normally built with an average ambient of 30°C, whereas the switchgear inside maximum operating temperature is 55°C. This has made necessary a derating of the transformer. In the past Westinghouse Switchgear has, of course, been adequately designed, but it has been necessary to calculate new operating data when operating conditions are changed.

The new Westinghouse line of current transformers is base-rated on a 55°C ambient base. They carry their nameplate current rating continuously. No longer need you figure currents and derate transformers—now *you read current on the nameplate directly* when the switchgear is installed and when operating conditions change.

This Westinghouse plus value is another example of how Westinghouse maintains leadership in Metal-Clad Switchgear design.

Write for complete information about other features of Metal-Clad Switchgear in Bulletin B-4016. Address Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60716

Westinghouse

METAL-CLAD
SWITCHGEAR

neighboring stores relighted with fluorescent.

In the meat department Mr Romey for long has been careful to use incandescent lighting for its satisfactory (flattering) color effect on pork, lamb and beef alike. In strategic ceiling openings, up 14 ft, 6 in., were located 22 PS lamps and reflectors. However, the intensity was low on the meats, about 25 ft-c and 20 ft-c generally elsewhere.

Spots, Floods, and Slimlines

A year ago, when slimline equipment was becoming widely accepted, Mr Romey asked us to help him relight. Our plan called for 4 continous runs of 8 semi-direct louvered bottom fixtures, each with 4—96 in. T-8 lamps on 300 ma tulamp ballasts. The two rows nearest the walls are up 16 ft and the two center rows are up 13 ft. (All are ceiling mounted, this is a "saw-toothed" ceiling rising to about 19 ft near each side wall.) The room is 47 ft, 6 in. wide and 67 ft, 6 in. long. In the 22 ceiling openings above and in front of the meat case were installed 11 Par 38, 150-w eyeball spots and 11 R40, 150-w floods. These are on a slightly inclined plaster line, 14 ft, 6 in. from the floor.

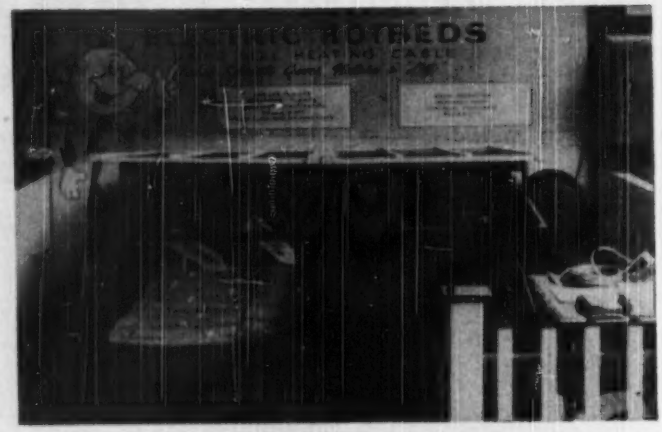
There were fine murals around the upper walls and these again became apparent. The surprising thing was, that no painting was done—although we had figured it would be. A good washing with water and a mild agent was done earlier.

Intensities from 45-60 ft-c

The general lighting intensities range from a low of 45 ft-c at wall line to a high of 60 ft-c in the center section, after 1,000 burning hours. The meat department has good color-quality. The punch lighting is subtle with fluorescent brightness around. Intensity is 60 ft-c generally here, and 71 ft-c on the face of the meat cases. The light does get inside and enrich the appearance of meats.

Amply satisfied with results here, Mr Romey asked us a short time later to prepare a plan to relight his other market. This we have done. The electrical work is let and the job should be finished soon. Again a combination of incandescent and fluorescent slimline will be used to gain maximum display effect.

Electric Hotbed Promoted at Flower Show



THE ENERGIZED HOTBED of Western Massachusetts Electric Company's exhibit at the first flower show in that section of the Bay State aroused keen interest among gardeners this spring. Delicate plants transported by heated conveyance from the University of Massachusetts in Amherst to West Springfield thrive well in their new surroundings. The "live" bed was 6 ft x 6 ft x 6 in. in dimensions, with a dozen varieties of flowers. A hardware cloth mesh of ¼-in. wire located above the bed safeguarded the exhibit against mechanical injury. A 60-ft length of the soil cable rated at 400 w. laid 6 in. below the earth surface and controlled by thermostatic switch maintained a minimum temperature of 65 F. General Electric Co and Rockbestos Products Corp co-operated with the non-merchandising utility in the display

• • •

Infrared Speeds Metal Mold Heating

Edwin L. Wiegand Co photo

VERTICAL OVEN with four radiant 2500-w infrared heaters provides quicker, safer method of heating softball kapok centers—saves space—uses less cord to produce livelier ball with reduced manufacturing costs

POWER SALES IN INDUSTRY

An open vertical oven using four 2,500-w infrared radiant heaters provides a quicker and safer method of heating metal molds used for forming the kapok centers of softballs at the George Young Co, Chicago. This vertical oven saves floor space and operating conditions are safer than those of the previously-used gas-fired convection oven. Continuous production-faster than the batch type convection oven—permits use of an increased percentage of kapok. Less cord is used, resulting in a livelier ball and reduced manufacturing costs.

The four heaters are used in two groups, mounted facing conveyor chain with metal molds inserted. Molds are heated to 300 F in approximately 20 min with one pass through the conveyor.

First of a series of reports published for the information of the electrical industry

UTILITY EXECUTIVES WHO UNDERSTAND GLASS-HEAT ARE WELCOMING IT

THE GREAT STRIDES being made throughout the country in the adoption of Continental Radiant Glass Heating Panels for house heating are making it increasingly necessary for the management and engineering executives of the electrical utilities to give immediate thought to this market for their product—a market which promises to multiply by several times, and to create a *profitable* household load.

Furthermore, it is important for every executive in the utility industry to learn the facts about *Glass-heat now*. Customer interest is mounting rapidly. As F. A. Compton, Vice President of the Detroit Edison Company, told a meeting of the Edison Electric Institute, in April, "There has been noticeable customer interest to the point where now they are inquiring, 'How *soon* will we have electrical house heating?'"

The advantages to the customer are so great, and so readily appreciated, as to virtually demand that you face the subject squarely, study it thoroughly and be ready with a uniform, company-wide policy and an encouraging rate which will enable you to take advantage of this new market for a very large and profitable payload.

Forward-looking executives in the field have been doing this. They have quickly seen and grasped the fact that they are already manufacturing the simplest, cleanest, quickest, most reliable and most satisfactory single source of house heating: electricity. So, at their invitation, we have been showing these utility executives some answers to what they considered vexing problems. They agree with Mr. Compton when he said, "Frankly, it's irritating to hear the remark that electrical house heating is too great a problem for us to handle—that it will raise havoc with our rate structure, our generating and distribution facilities—and that we should discourage it. We all know that you can't stand still in any business."

Thousands of homes and other buildings throughout the United States, Canada and abroad are being successfully and economically heated by *Glass-heat*, at this very moment. And they are being sold their electricity at rates which return a very welcome profit to the utilities which serve them.

In the light of their experience and ours, we sincerely urge all utility executives and engineers who do not have the full story of *Glass-heat* not to arrive at premature conclusions. *For your own protection, get the facts.* One simple example: Contrary to a widespread misapprehension, electric heating is a controllable load. Unless you understood the application of the cut-off device, already in use in many areas, you naturally might still be concerned about peak demand periods.

○ ○ ○ ○ ○

Continental, pioneer and largest manufacturer in the radiant glass heating field, has assembled, digested and clearly set down on paper for you the facts utility executives should have right now about electrical house heating. You will find it all in this concise summary, "WHAT EVERY UTILITY EXECUTIVE SHOULD KNOW," just off the press. To bring yourself up-to-date on this increasingly vital subject, we urge you to send for your copy now. Just fill out the coupon below, or drop us a line requesting it. Specify the number of copies you would like. We will be happy to send them along. And, incidentally, we will also be happy to answer your specific questions on this subject, at any time . . .

CONTINENTAL
RADIANT GLASS HEATING CORPORATION
1 EAST 35TH STREET, NEW YORK, N. Y.

CONTINENTAL, 1 East 35th St., N. Y.
Please send me..... copy(ies) of "WHAT EVERY UTILITY EXECUTIVE SHOULD KNOW."

NAME .....
TITLE .....
COMPANY .....
ADDRESS ..... ZONE ..... STATE .....

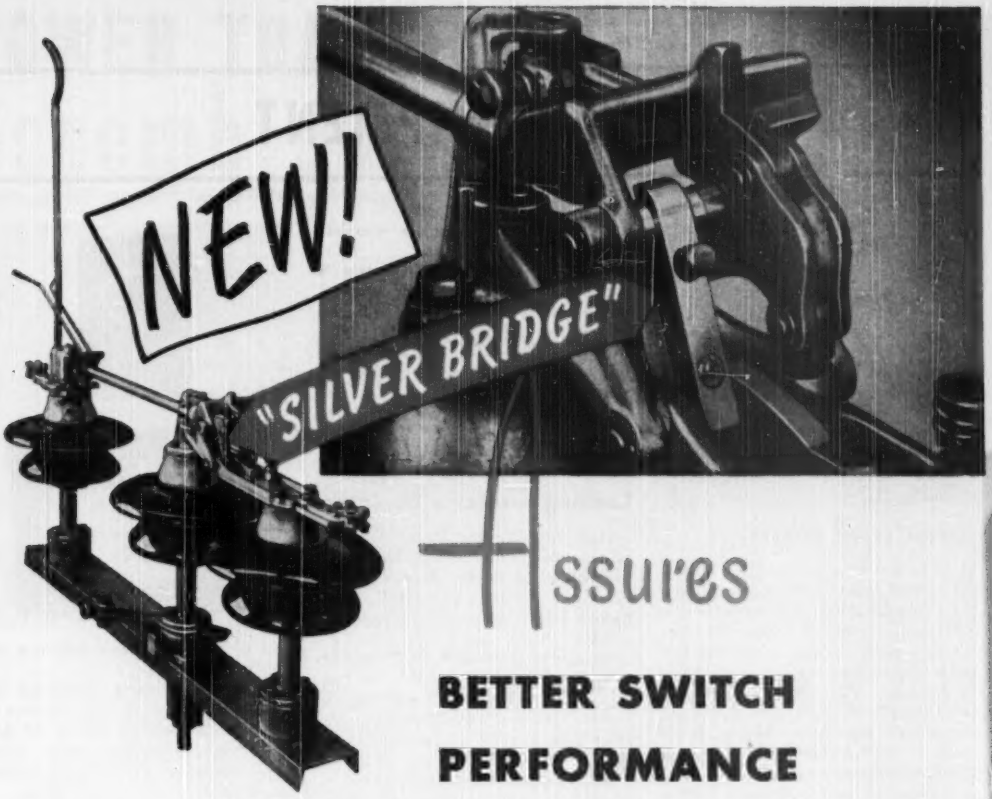
INDUSTRIAL BRIEFS

Dielectric Ovens sanitize burlap feed bags for reuse at the Eastern States Farmers' Exchange, Inc, Buffalo, N. Y., feed manufacturers, saving farmer members approximately one million dollars each year in packaging costs. The mill uses 50,000 bags a day. The dielectric heating process destroys the common disease-producing organisms with no detrimental effect on the life or soundness of the burlap. Some of the chemicals tried for this purpose have damaged burlap. Steam, too, was found to be destructive. The dielectric ovens are 60 ft long and each is rated at 60 kw. Thirteen million cps high frequency energy uniformly heats 250-bag bales.

Capacitors save $80 a month on the power bill and jump power factor 45% at the Advance Die & Tool Co. Cleveland, Ohio. A 60-kva capacitor installation increased the power factor from 68 to 99% resulting in a substantial reduction in the demand billing charge. The capacitor installation has required no servicing in more than a year.—Cleveland Electric Illuminating Co, Kenneth Gottschalk, Power Sales Engineer.

Surface Raceway Distribution system in the entire 21,875 sq ft production area of the new Levi Strauss & Co, San Jose, Cal., factory permits over 400 electric sewing machines to be moved to various positions on the floor as dictated by production line demands. It provides flexible plug-in connections and support for 245 fluorescent lighting fixtures and enables additional fixtures to be quickly installed; also the easy relocation of any of the existing fixtures. Conduit and boxes are eliminated, drop cords are kept off the floor.

Zoned Infrared heat provides rapid curing action and a hard, true color to synthetic enamel on gasoline engines for portable power saws at McCulloch Motors Corp, Los Angeles. The all-metal conveyorized oven has 21 heaters rated at 230 v, 1,800 w each, totaling 37.8 kw. Oven has inside clearance of 26 in., sufficient to handle two sizes of engines weighing 17 and 37 lb which are rotated as they pass through. Engines spend about two minutes in the oven.



Assures BETTER SWITCH PERFORMANCE

The new Hi-Voltage "Silver Bridge" replaces the customary braided shunt at the switch hinge. It consists of one or more pairs of copper bars welded to silver-nickel accurately finished for contact with silver bands at the hinge centers.

Locked as a self-aligning, non-adjustable unit, contact pressure is maintained by stainless steel compression springs. The silver alloy used at the current exchange surfaces has the permanent low contact resistance of fine silver.

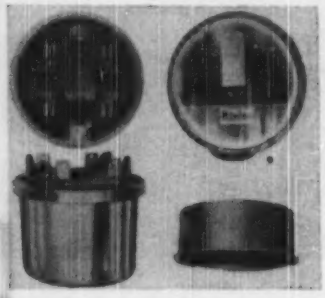
The entire construction is so simple and substantial that it cannot introduce problems of maintenance or operation. For example, the new "Silver Bridge" excludes the second set of make-and-break contacts that have been customary on switches which eliminate flexible shunts. Ease of operation is assured, and the milli-volt drop of the "Silver Bridge" is less than half of a new 600-ampere braided shunt.

Ask your Joslyn Salesman to demonstrate the outstanding advantages of the Hi-Voltage "Silver Bridge". He has a sample that you can examine thoroughly right in your own office.

HI-VOLTAGE EQUIPMENT COMPANY

4000 EAST 116TH STREET • CLEVELAND 5, OHIO

NEW EQUIPMENT



Street Light Control

SET TO TURN street lights on at dusk and off at dawn, a Sunswitch mounted in a standard watthour meter case is adjustable from 1 to 6 ft-c. The case permits quick inspection of relay contacts and components during operation.

A time delay prevents intermittent operation from lightning flashes, or automobile headlights. Two tubes are said to operate far below maximum load capabilities to extend tube life.

The power relay carries a 3,000-w incandescent lamp load, although a 500-w size is available.

Ripley Co, Inc, Middletown, Conn.

•

Aerial Revolving Ladder

SERVICING street lights or overhead lines is reportedly facilitated with a new hydraulic aerial revolving ladder. Model 35LD20 can also be used to reduce pole climbing for attaching pole hardware and stringing lines. It places a workman on a platform 35 ft in the air in 18 sec. The ladder can be positioned at any point in an 85-deg arc, and rotated through a complete 360-deg circle.

Power for the hydraulic system is supplied by a power take-off mounted on the chassis transmission. The ladder is said to lock automatically in all raised positions. The operator, standing on lower platform step, has all controls within reach.

The American Coach & Body Co, 9503 Woodland Ave, Cleveland 4, Ohio

•

Leaking Insulator Detector

DETECTING leaking power line insulators and indicating dirty insulators, tree limbs, etc, contributing to power losses are said to be performed by the Electro-Alarm unit with plugged-in speaker.

The assembly consists of (1) master control unit, (2) proximity detector, (3) warning horn, (4) trouble check flasher light and (5) speaker. Operation is from a 6-v wet battery of the service vehicle.

When using the unit, the vehicle is driven parallel to the power line. As a leaking insulator is approached or passed, the steady hum changes to a high-pitched whistling. Retracing the route with sensitivity adjusted downward will select the pole with the arcing insulator. Corona arcs are similarly detected. Dirty insulators or trees extending into the line are detected by an appreciable decrease in the regular 60-c speaker hum at the point in question. Line hum can be detected at distances varying from 25-40 ft for 220 v to 125-150 ft for 2,300 v.

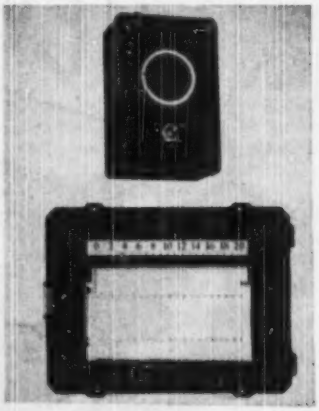
This equipment has also been adapted as a boom proximity warning device. A warning horn sounds if the boom of the rig enters a pre-set danger zone. It is reported to be sensitive to voltages from 110 up, and permits proximity warnings from 4 to 200 ft.

Electro-Alarm Sales Co, 320 WOW Bldg, 14th & Farnam St, Omaha, Neb.

•

Illumination Meter

RAPID FLUCTUATIONS in illumination intensity are said to be recorded by a new photoelectric light recorder. Developed originally to chart the fast-changing light output of railway fusees, this instrument is reported useful where wide variations in light intensity



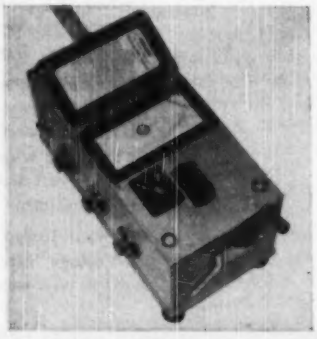
must be recorded faster than can be done by hand.

The sensing element, which can be placed wherever convenient, employs a Photronic photoelectric cell of the dry disk type. A built-in Viscor filter matches its color response to that of the human eye.

Full scale values of 20, 40, or 80 ft-c are selected by a single switch. The recorder can also measure candlepower of any value by proper adjustment of distance from the light source.

Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark 5, N. J.

•



Insulation Tester

TESTING insulation resistance of practically all types and sizes of electrical equipment is said to be possible with the Megger insulation tester. It is reported to be useful in several kinds of field tests, particularly in

POWER TRANSFORMERS assembled HERE..

This section of the Pennsylvania plant is known as the Finishing Department. All Power transformers stop here for final assembly and finishing before going to the Test Department.

The group of transformers pictured is representative of the types of Power transformers designed and manufactured by Pennsylvania.

Transformers in this group range from 2500 Kva to 30,000 Kva. Some are equipped with no load tap changers; others with underload tap changers.

Many types of cooling methods are represented — self-cooling, forced air cooling, and forced oil cooling.

Methods of oil preservation include Inert Gas-Oil Seal, Oil Expansion Tank, and Inert Gas Pressure Systems.

Other Power transformers regularly built by Pennsylvania have ratings up to 100,000 Kva and voltages up to and including 230 Kv.

Pennsylvania TRANSFORMERS

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PENNSYLVANIA • *Greater Pittsburgh District*

Pritchard Built POWER PLANTS

Operate Profitably... Efficiently

Every refinement of modern electrical engineering is embodied in this 7500 KW plant recently designed, engineered and constructed by J. F. Pritchard & Co. for Missouri Utilities Co. of Oran, Mo.

Throughout the industry, Pritchard built power plants are known for their sound design, engineering and construction—for operational efficiency and freedom from trouble.

Pritchard's single responsibility contract offers you complete service including Analysis of Requirements, Economic Studies, Design, Engineering, Purchasing, Field Construction, Guarantees and Operating Tests . . . Firm Prices quoted on a "Turnkey" basis.

Take advantage of Pritchard's years of experience in the Power Engineering and Construction field. Let us design and build your next power plant for you.

Write for FREE Bulletins

J.F. Pritchard & Co.

DESIGN • ENGINEERING • CONSTRUCTION

Dept. No. 48 908 Grand Ave., Kansas City 6, Mo.

District Offices:

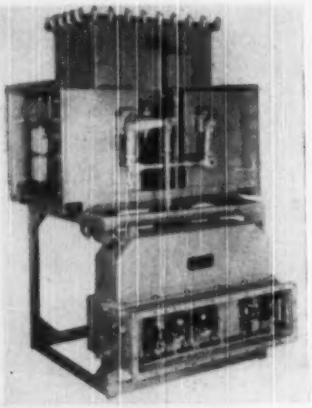
CHICAGO • HOUSTON • NEW YORK
PITTSBURGH • TULSA • ST. LOUIS

testing circuit breaker bushings and in making time-resistance (dielectric absorption) tests on apparatus of relatively high 10-min insulation values.

The wide range—up to 50,000 megohms, with an operating voltage of 2,500 v dc—is made possible by two overlapping scales which result in an 8½-in. scale length. A complete description appears in Bulletin 21-20-9.

James G. Biddle Co, 1316 Arch St, Philadelphia 7, Pa.

•



Sectionalizing Device

CAPABLE of providing continuous service to important loads, a new sectionalizing device has been designed to serve one load from either or two feeders.

The 5,000-v, 400-amp unit combines an air break isolation link compartment, two single-throw load break oil switches, and an automatic feeder transfer mechanism in one factory-assembled unit.

Fully automatic transfer of load from preferred to emergency feeder, and automatic transfer back to preferred source when it is re-energized, is provided by transfer mechanism.

MORE NEW EQUIPMENT

Just Received

Appearing Next Issue

RUNNING BOARD AND SWIVEL
No climbing for overhead wire pulling after tow line is up

WEATHERPROOF DUCT
Low-reactance feed-in duct for horizontal or vertical use

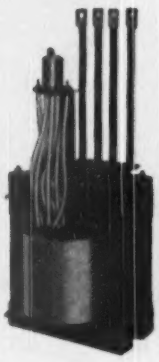
HOOK-ON WATTMETER
No service interruption for real and reactive measurements

BREAKDOWN TESTER
Insulation testing instruments with voltages to 30,000 v ac

Better... Lighter Weight... Smaller... More Efficient... Less Costly to Store... Easier to Install

4 NEW PENNSYLVANIA POLE STAR TRANSFORMERS

37½ · 50 · 75 · 100 KVA



Interior assembly of 75 Kva POLE STAR. Core can be taken apart and rebuilt without changing the core loss or exciting current.

The new 100 KVA POLE STAR TRANSFORMER

is **35%** *lighter*

requires **36½%** *less oil*

covers **35½%** *less floor area*

than the 100 KVA Stacked Core Transformer it replaces

Now a COMPLETE LINE OF POLE STARS from 3 KVA through 100 KVA

The four transformers now added to the POLE STAR line are fundamentally the same as the original POLE STARS. Cores are wound of cold rolled steel. Core laminations are individually lapped for low exciting current and ease of disassembling and rebuilding the core and coil unit. On 2400 and 4800 volt units straight, side-issuing, high voltage bushings, with insuleting caps, replace pockets and pocket bushings. Transformers are of Sealed Tank construction. Synthetic rubber gaskets are used throughout.

In other words: The POLE STAR is a better transformer than the stacked core transformer it replaces. It operates with greater efficiency and at less cost. It is lighter in weight, smaller in dimensions, cheaper to store and easier to install.

Write for Catalog No. 1049

***Pennsylvania* TRANSFORMER COMPANY**

CANNONSBURG, PENNSYLVANIA

Greater Pittsburgh District

P.S. **LET THE POLE STAR BE YOUR GUIDE... Product Of Long Experience—Safe Thrifty And Reliable**

If you've ever been up on a 50-foot stick when your life depends on the quality of the belt and safety strap you use, you will appreciate the high quality and care that is so much a part of all Klein equipment. When life's at stake, there can be no compromise with quality. Old timers know that Klein equipment has stood for quality in linemen's tools and equipment—"since 1857."

ASK YOUR SUPPLIER

Foreign Distributor:
International Standard Electric Corp.
New York

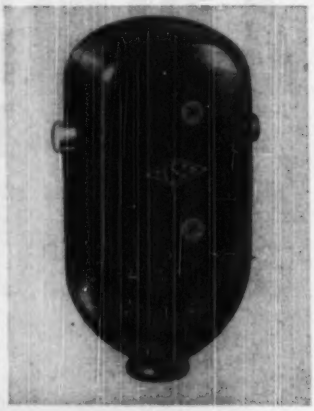
If you have not received a copy of the new Klein Pocket Tool Guide, write for one. It will be sent without obligation.

Mathias KLEIN & Sons
Established 1857
Chicago, Ill., U.S.A.
1200 BELMONT AVENUE CHICAGO 14 ILLINOIS

Two gang-operated single-throw load break oil switches are connected through air break links to a common load tap. Control transformers are enclosed in the unit oil switch tanks. The unit can be furnished with entrances for either underground or overhead cables.

G&W Electric Specialty Co, 7780 Dante Ave, Chicago 19, Ill.

•



Potential Switch

MODIFICATION of the snap-action Micro Switch has resulted in a potential switch for watthour meter testing that is said to suit requirements of manual control of rotating standard potential. Only about 6 oz of pressure are needed to operate the switch. Total pushbutton travel is reported at less than $\frac{3}{32}$ in. Life expectancy is reported at 5 to 10 million operations.

Catalog No. 810 potential switch is spdt; potential can be thrown on by the thumb and off by one finger. Silver contacts are rated at 10 amp, 240 v ac. The $\frac{11}{32}$-in. hole at end of the case will accommodate No. 16 2/C type SJ cord.

The Eastern Specialty Co, 3617–19 N. 8th St, Philadelphia 40, Pa.

•

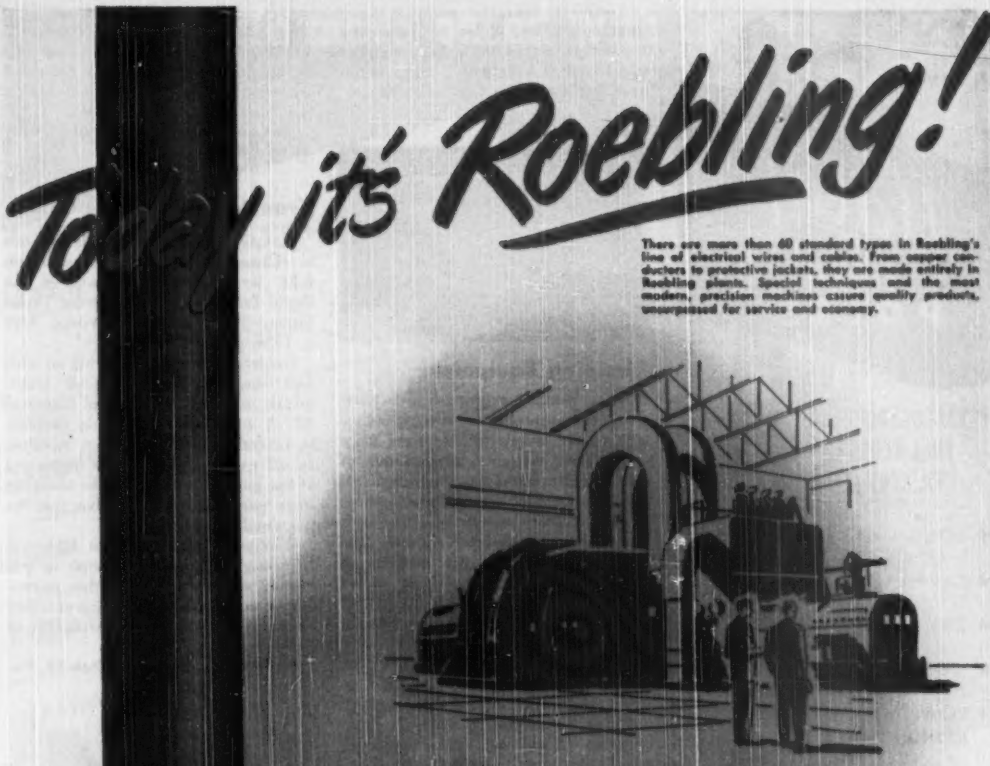
Deadend Tool

SINGLE STRINGS of high-voltage insulators may be changed out with a new deadend tool that can be used on poles, crossarms, or steel tower arms. The tool is equipped with interchangeable conductor clamp sockets, adaptable to bolted or compression-type clamps for use on conductors ranging from No. 2 copper to 605 Mcm ACSR. A detachable "cumalong" hook swivels to engage hot line wire gaps used where snubbing type conductor clamps are on the line. Eyebolts support an insulator cradle at the forward end.

Castings are lightweight heat-treated

Today it's Roebling!

There are more than 60 standard types in Roebling's line of electrical wires and cables. From copper conductors to protective jackets, they are made entirely in Roebling plants. Special techniques and the most modern, precision machines assure quality products, unsurpassed for service and economy.



for V. C. Cable with superior heat resistance

WHEREVER CIRCUITS heat up, you'll get new measures of dependability . . . save both time and money . . . with Roebling Varnished Cambric Cable! It has extreme resistance to heat and is your A-1 specification for leads for generators, transformers, motors and oil switches.

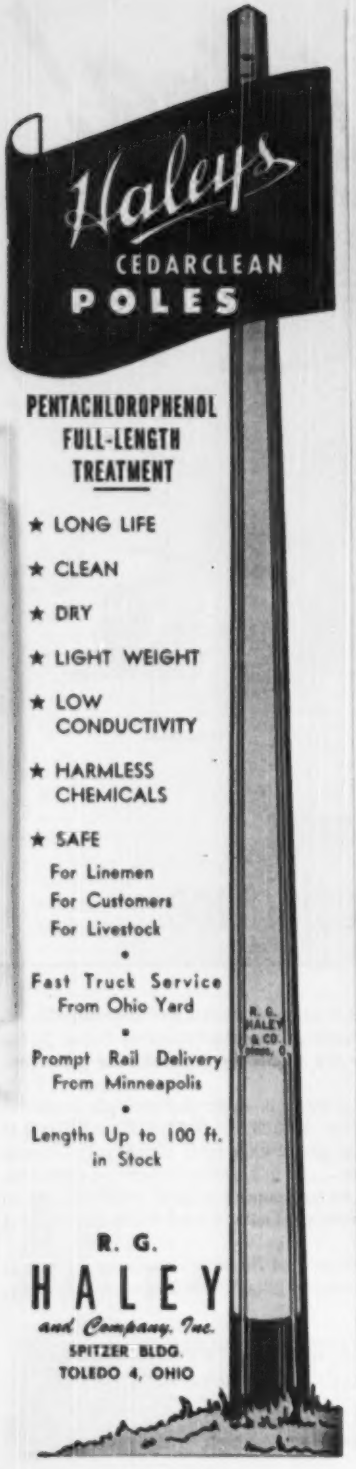
Roebling Varnished Cambric Cable is made in single and multiple conductor types—single, from 2,000,000 C. M. to No. 14 A.W.G.—multiple from 500,000 to No. 14 A.W.G. Both constructions are adapted for use up to 17,000 volts between phases for unshielded multiple conductor . . . up to 21,000 volts between phases for single conductor and shielded cables on ungrounded neutral systems . . . up to 28,000 volts between phases for single conductor and shielded cables on grounded neutral systems.

Write for complete information, or call on your Roebling Distributor for help in choosing the best cables for your requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING A CENTURY OF CONFIDENCE

Atlanta, 934 Avon Ave. * *Boston*, 51 Sleeper St. * *Chicago*, 5525 W. Roosevelt Road * *Cincinnati*, 3253 Fredonia Ave. * *Cleveland*, 701 St. Clair Ave., N. E. * *Denver*, 4801 Jackson St. * *Houston*, 6216 Navigation Blvd. * *Los Angeles*, 216 S. Alameda St. * *New York*, 19 Rector St. * *Philadelphia*, 12 S. Twelfth St. * *Portland*, 1032 N. W. 14th Ave. * *San Francisco*, 1740 Seventeenth St. * *Seattle*, 900 First Ave. S.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON 2, NEW JERSEY



aluminum alloy. Poles are laminated, treated to retard moisture absorption and tested to withstand 75,000 v per ft.

A. B. Chance Co, Centralia, Mo.

•

Charging Equipment

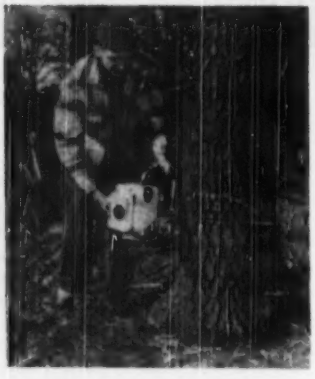
SINGLE-CIRCUIT rotating-type battery-charging equipment for electric industrial trucks is reported to have more than 2,000 available adjustments of charging characteristics. Manufactured in two models, the charger is adaptable to, and includes components for, both lead-acid and nickel-iron-alkaline batteries. The chargers are said to be protected against generator or motor overload.

Automatic features include a battery cut-off and charger shut-down when battery is fully charged. There is also automatic disconnection of the charger from the power line and opening of the charging circuit in case of power interruption, and automatic restart of the charger upon resumption of service.

One model covers batteries up to 530 amp-hr capacity, and the other up to 750 amp-hr. They operate from 220/440 v, 3-ph, 60 c.

General Electric Co, Apparatus Dept, Schenectady 3, N. Y.

•



Portable Power Saw

LAND CLEARING, felling trees, bucking timber, cutting cordwood and making posts are reported among uses of a portable power saw weighing 25 lb complete with blade and chain.

Model 3-25 is powered by a special 3-hp gasoline engine which drives a toothed cutting chain. The power unit is single-cylinder, 2-cycle, air-cooled construction built almost entirely of magnesium-alloy die castings.

McCulloch Motors Corp, Los Angeles, Calif.

•

Transformer Oil Inhibitor

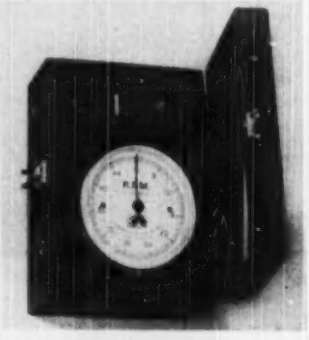
LIFE of transformer insulating oils is claimed to be increased up to 14-fold by di-tert-butyl-para-cresol in liquid form (see "New Life for Transformer Oils," ELECTRICAL WORLD, May 8, 1950, p 84).

Oxidation tests were carried on with four commercial uninhibited transformer oils, with and without Impruvol 20. A 4-to-8-fold increase in stability to oxidation is said to have resulted. In all cases, rate of break from end of the induction period to the sludging stage was equal to or less than that for the uninhibited oils.

It was also reported that Impruvol 20 brought about the increase in test life without increasing sludge quantities or neutralization numbers obtained on uninhibited oils having a test life of about five days.

Koppers Co, Inc, Pittsburgh 19, Pa.

•



Hand Tachometer

THE PLASTIC LENS of Model JP hand tachometer is said to prevent breakage and allow using the instrument for rough service work. It is a single-range tachometer, with a 3-in. dial and a range from 400 to 4,800 rpm.

Herman H. Sticht Co, Inc, 27 Park Pl, New York 7, N. Y.

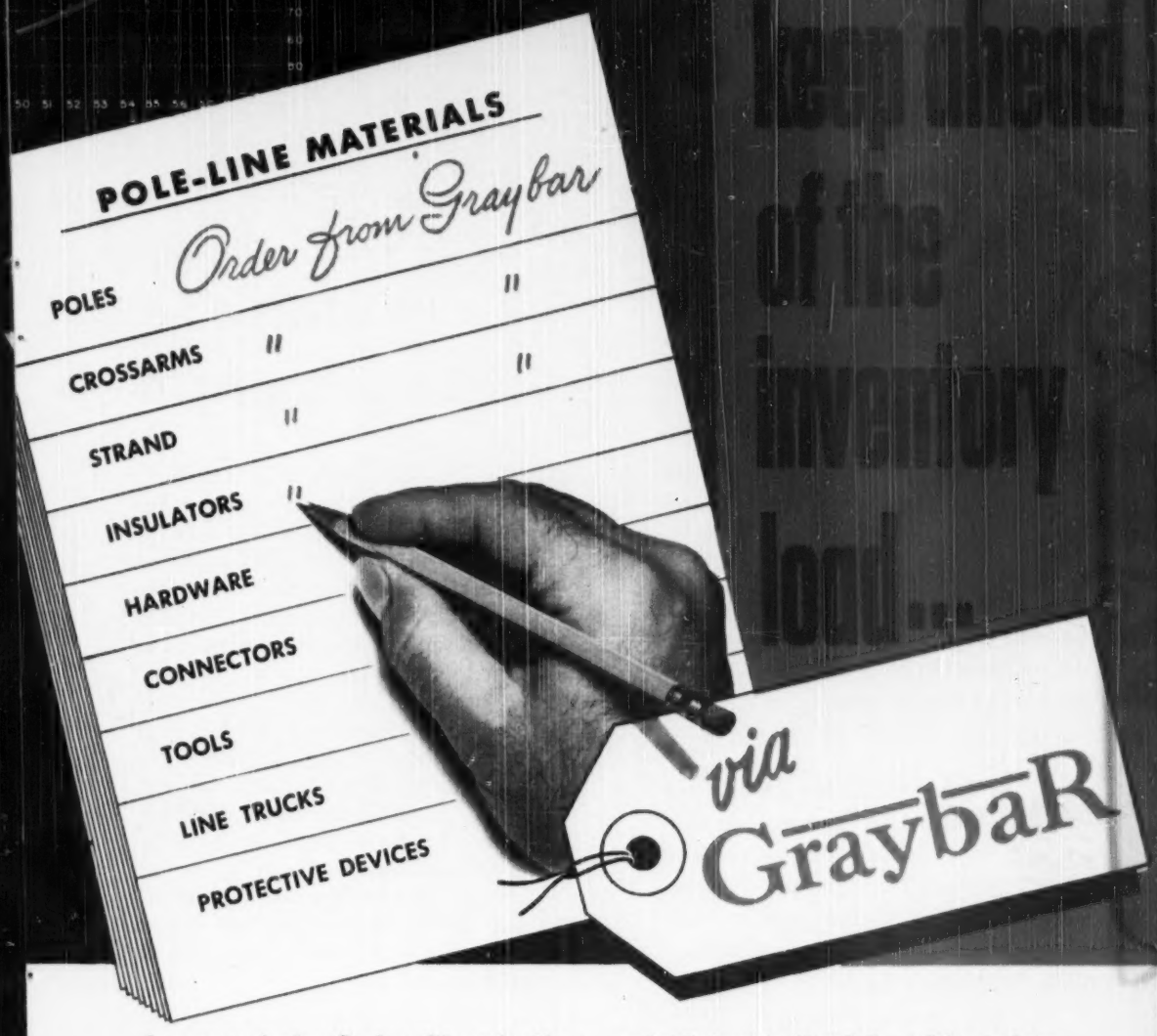
•

Feedwater Treatment

SECOND-STEP phosphate treatment in boiler feedwater preparation, it is claimed, may be replaced by a new hot Zeolite process. It is said that Permutit Q, a sulphonated styrene

(*Continued on page* 195)

To move ahead with the power load —



As power use develops, Graybar will be ready with an expanding inventory of first-choice materials and supplies for your transmission and distribution lines. A principal function of Graybar, as distributor of these items, is to lighten the inventory load of both the utility company and the manufacturing supplier. Stocks of thousands of different pole-line items in Graybar warehouses throughout the nation serve as a "cushion" . . . absorbing the variables between supply and demand. Graybar can adapt the volume and variety of these stocks to your needs. Thus you gain all the advantages of a large "supply department" without the overhead of extra storage space, manpower, and operating expense.

Graybar is growing in manpower and facilities – and continually improving its methods – to bring you faster deliveries of an ever-widening range of items. Since 1940, the number of Graybar office-and-warehouse units has increased from 82 to 105.

Those are the principal reasons why, as the load grows during the 1950's, you'll do well to keep as your supply line the "via-Graybar" line-up of dependable items for all your needs. As always, your Graybar Representative will have a keen personal interest in seeing that your needs are filled properly, on schedule. And a Graybar Outside Construction Specialist is always on call to join his knowledge with yours in solving special problems. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.* 5058

For information about some of the first-quality products Graybar distributes, see the following pages

4 REASONS WHY RAINIER CROSSARMS belong in YOUR pole-line program

1 **SELECTION** — Extra value in crossarms, as in many other quality products is the end result of *planned manufacture*. With American Crossarm and Conduit Company, careful selection of timber for manufacture of Rainier crossarms is the first important step.

2 **KILN DRYING** — Rainier kiln drying is superior because of scientific control during the seasoning period — correct temperature and the right humidity all the time while in the kiln means all fungus growth killed — timber seasoned throughout.

3 **SEASONING** — Rainier air seasoned crossarms are also carefully seasoned by control of air circulation and by the location of the seasoning sheds, as well as proper piling of the timber during the drying period.

4 **STOCKS** — The American Crossarm and Conduit Company, manufacturers of Rainier crossarms, through Graybar offer the careful buyer of crossarms an additional service — stocks at strategic locations. For planned-ahead buying or for emergencies, this fact is your assurance of lower shipping costs — quicker service.

Remember! A crossarm produced from improperly or carelessly processed timber might cost less at the time of purchase, but it certainly *is not cheaper per year of life service.*

For further information on crossarms that may pay you dividends in lowered maintenance and replacement costs, write or phone your nearby Graybar Line Construction Specialist. Graybar is located in over 100 principal cities.

AMERICAN CROSSARM AND CONDUIT COMPANY

RAINIER WOOD PRODUCTS TRADE MARK

via Graybar **To move ahead with the POWER LOAD . . .**

ROPE USES

NEW STRENGTH CHART

FIBRE GROWING

KNOTS AND SPLICES

HISTORY

MANUFACTURING

Important Facts for Rope Users

From cover to cover, the 32 pages of this handy, pocket-size booklet are just crammed full of important facts about the history and manufacture of rope. There's a lot of useful everyday information, too . . . for utility, marine and industrial uses . . . how to splice and tie knots . . . the really practical kind that are used in many occupations. There's a detailed description about how to rig a block and tackle, with a weight and strength chart to aid in selecting proper rope sizes. Inside pages are attractively printed in two colors . . . with a heavy four color cover . . . a fine sales aid and reference booklet. Write for a copy.

AMERICAN MANUFACTURING COMPANY • BROOKLYN 22, N. Y.

BRANCH FACTORY: ST. LOUIS CORDAGE MILLS, ST. LOUIS 4, MO.

SALES OFFICES: BOSTON • CHICAGO • HOUSTON • NEW ORLEANS • PHILADELPHIA • SAN FRANCISCO

ROPE • TWINE • MARLINE
OAKUM • PACKING
ELECTRICAL & CARPET YARNS

Keep ahead of the INVENTORY LOAD . . . via Graybar

Made under carefully controlled conditions. Each lot of insulators is tested under methods set by American Institute of Electrical Engineers in Specifications No. 41-1944 (ASA C 29-1944) and by the American Society for Testing Materials D750-43T. Inspection is conducted in accordance with Edison Electric Institute Specifications TD-51-1942.

Graybar supplies Hemingray Insulators

GRAYBAR is ready to fill your Hemingray Power Insulator requirements. Prompt shipment can be made on short notice.

Hemingray Insulators are manufactured under careful supervision from the finest materials. Constant inspection and exhaustive testing assure uniform excellence. Dependable performance in actual operation has made Hemingray the accepted standard in the industry.

Check with your nearest Graybar outlet for additional information and recommendations on filling your power insulator requirements.

HEMINGRAY
POWER INSULATORS

American Structural Products Company
MUNCIE, INDIANA

Subsidiary of **Owens-Illinois Glass Company**

via Graybar **To move ahead with the POWER LOAD . . .**

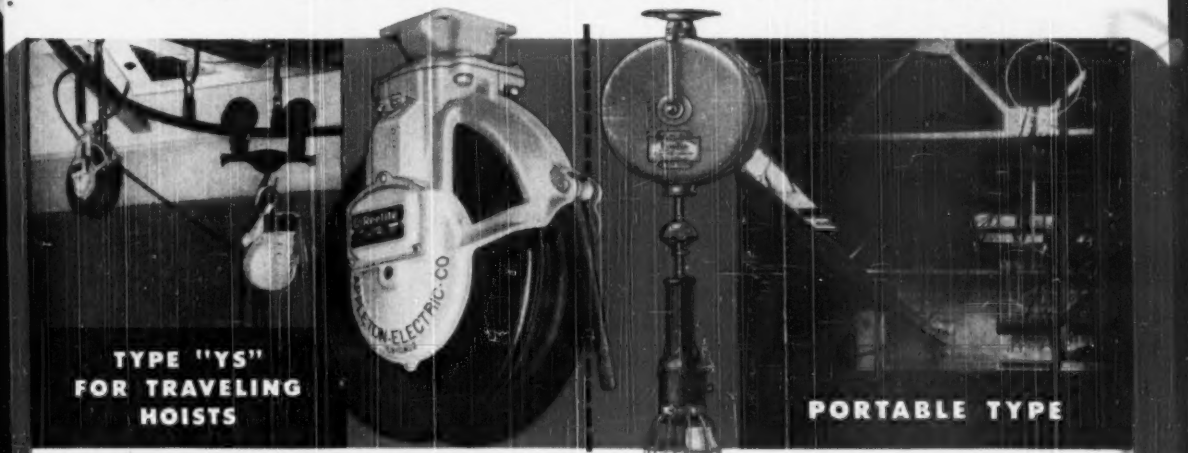
Positive Safety

FOR PLANT AND PERSONNEL

APPLETON REELITE

TRADE MARK

Automatically Takes Up, Pays Out Conductor Cable
Keeps Cord Reeled Up Safely Out of the Way



The Appleton Type "YS" Reelite for traveling hoists is built with a swivel base, permitting cord to be fed in any direction. Mounted at the mid-point, a Type "YS" Reelite equipped with 45 feet of cord will serve a stretch of track 90 feet long, straight or curved.

The Type "YS" Reelite eliminates the necessity for exposed current collectors, trolleys or wires. Outer cover easily removed to service brushes and power spring, or to make solderless line connections direct to terminal block. Oil-less bearings at all points of rotation.

RATING: 15 Amperes, 550 Volts A.C.; 250 Volts D.C.

The Appleton Portable Reelite takes light right where it's needed, in car-loading, stock-keeping, machine inspection, building maintenance—on hundreds of jobs that require bright, movable, safe illumination. Cord is paid out against spring tension and held to desired length by a ratchet stop. Works like a window shade. Cord is kept kinkless, tangle-free—safely out of the way when not in use, with never any excess underfoot. Helps avoid accidents, cuts cord maintainance costs to a minimum.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1703 Wellington Avenue • Chicago 13, Illinois

14 Branch Offices and 7 Resident Representatives in all Principal Markets

SEND TODAY for free copy of new Bulletin 504. Fifty full pages describing Appleton Reelites shown here, plus special types and combinations for power tools, air and liquid lines. Or see Sweet's File. Page 2a/10a.

APPLETON ELECTRIC PRODUCTS

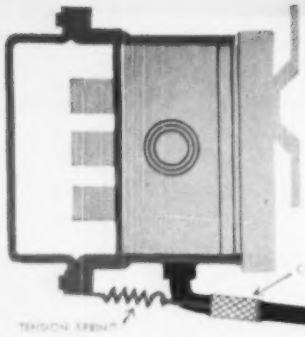
CONSTANT DUTY TYPE FOR HEAVY JOBS

Carries smooth, uninterrupted power to moving electrical machines. Automatically winds up and pays out rubber covered cable to cranes, hoists, elevators, lifting magnets, generator sets—heavy mobile equipment of every kind. Pays for itself in efficiency, safety, cable protection.

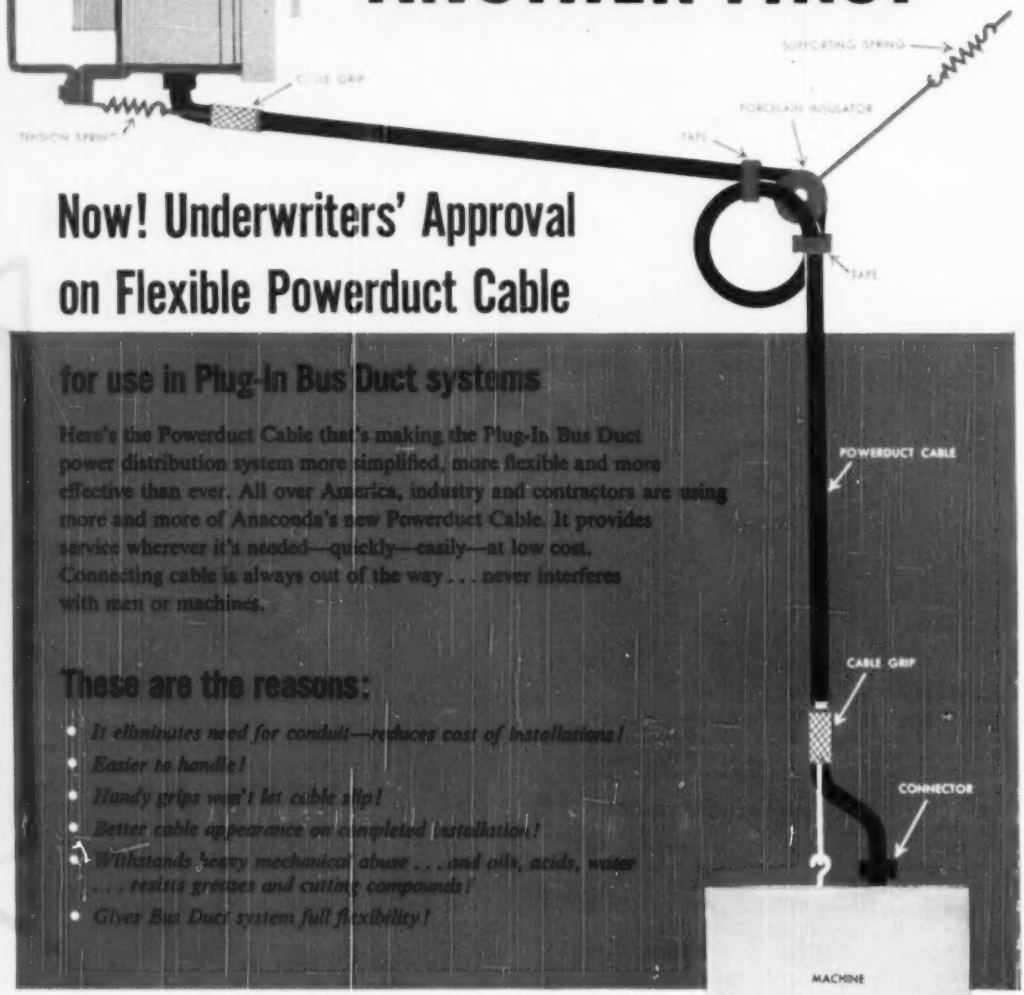
APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

Keep ahead of the INVENTORY LOAD . . . via Graybar



ANOTHER "FIRST"



Now! Underwriters' Approval on Flexible Powerduct Cable

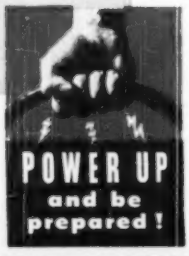
for use in Plug-In Bus Duct systems

Here's the Powerduct Cable that's making the Plug-In Bus Duct power distribution system more simplified, more flexible and more effective than ever. All over America, industry and contractors are using more and more of Anaconda's new Powerduct Cable. It provides service wherever it's needed—quickly—easily—at low cost. Connecting cable is always out of the way . . . never interferes with men or machines.

These are the reasons:

- *It eliminates need for conduit—reduces cost of installations!*
- *Easier to handle!*
- *Handy strips won't let cable slip!*
- *Better cable appearance on completed installation!*
- *Withstands heavy mechanical abuse . . . and oils, acids, water . . . resists greases and cutting compounds!*
- *Gives Bus Duct system full flexibility!*

Get the details today on ANACONDA Powerduct Cable—the cable that's engineered specifically for these modern power distribution systems. Ask your nearest Anaconda Sales Office. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.



The right cable for the job ANACONDA® WIRE AND CABLE

via Graybar

To move ahead with the POWER LOAD . . .

You know it's RIGHT when you specify CHANCE

Chance Anchors

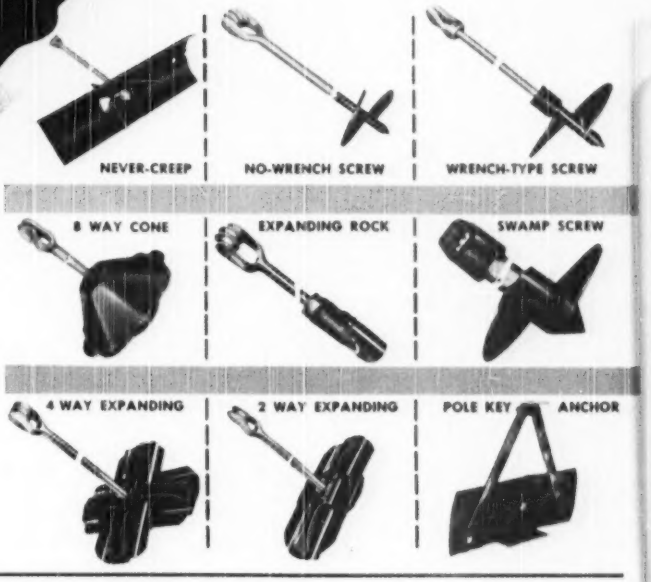
meet every guying need

Whatever your guying requirement may be, there's a Chance Anchor that will do the job most efficiently. The Anchors shown here are made in a wide variety of sizes. Each type is designed for certain soil and guying conditions. One of these Anchors will do your specific job better than any other anchor you can choose.

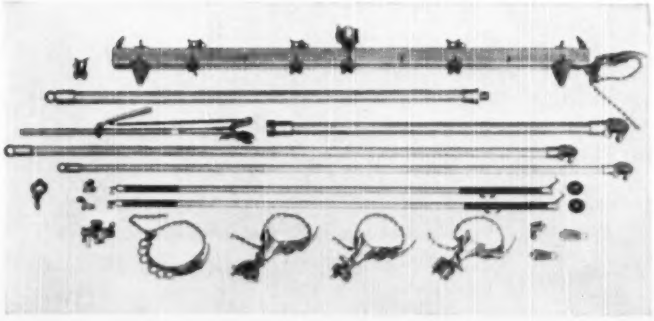
CHANCE 8 WAY EXPANDING ANCHOR

The most widely used of all Chance Anchors is the 8-Way Steel Expanding Anchor shown above. This anchor gives you better anchoring for less money. Greater load distribution, due to the cone shape and the close proximity of the blades, makes this new anchor more powerful than other types of expanding anchors. Simplified construction makes the 8-Way easier to expand and more applicable to varied soil conditions. This simplicity also saves on manufacturing costs—and this saving is passed on to you!

Your Graybar man can give you the complete details on this and all other Chance Anchors.



Chance Hot Line Tools . . .



keep lines energized

. . . linemen Safe!

Your customers have a right to expect continuous service and you can give it to them safely by making line repairs "Hot." Graybar can supply you with the tools—Chance Aluminum Fitted Tools—in complete sets like the one at right or as individual tools to complete your equipment.

A. B. CHANCE CO.
CENTRALIA, MO.

C30-17

Keep ahead of the INVENTORY LOAD . . . *via* Graybar

"Not a Single Solenoid Has Burned Out On Our Water Valves Since We Protected Them With FUSETRON dual-element FUSES"

"During the winter of 1948-49 solenoids on five of our water valves burned out due to freezing of the water.

"The replacing coils alone cost us about $50.00 but the labor and operating loss ran much higher.

"To prevent these losses we installed a Fusetron dual-element fuse to protect each coil.

"During the winter of 1949-50 we did not lose one single coil due to burnout — but we did blow quite a few Fusetron fuses.

"The cost of replacing these Fusetron fuses was nothing to the loss we would of had if they hadn't blown."

E. C. Willy, Chief Electrician
H. J. Kaiser Aggregate Plant,
Pleasant, California

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

Fusetron DUAL ELEMENT Fuses

give 10-point protection

1. Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

via Graybar **To move ahead with the POWER LOAD . . .**

Fusetron DUAL ELEMENT Fuses

Give All-Purpose Protection

because . . . The fuse link element opens on short-circuit — the thermal cutout element protects on overloads — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to the same dimensions as ordinary fuses — fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

Don't Risk Losses

One burned out solenoid
One needless shutdown
One lost motor
One destroyed switch or panel

may cost you far more than replacing every ordinary fuse with a FUSETRON dual-element fuse.

Mail the Coupon Now

for complete information about Fusetron fuses and their 10 point all-purpose protection.

FUSETRON is a trade-mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.

Bussmann Mfg. Co., University at Jefferson
St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON Dual-Element FUSES.

Name .....
Title .....
Company .....
Address .....
City & Zone ..... State ..... BM

Keep ahead of the INVENTORY LOAD . . . via Graybar

COFFING HOISTS

built for years backed by BETTER SERVICE

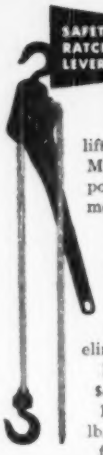
Here is a line of hoists built to stay on the job, reduce time-consuming breakdowns, protect men and equipment with a wide margin of safety.

Prompt, efficient Coffing service, immediate shipment of replacement parts gives further assurance of complete satisfaction for years to come.

Choose the size and type to fill your requirements and find out for yourself that there is a difference in hoisting equipment.

QUIK-LIFT ELECTRIC HOISTS

Ruggedly built for the most continuous assembly line use. For long life, all moving parts are sealed, running in oil. For safety, parts are tested at 100% overload. **Seventeen models** — 500 to 4,000 lb. capacities.



SAFETY-PULL RATCHET LEVER HOISTS

A safe, sure lift for any load. Multiplies man power, protects men and equipment. Dual ratchet and pawl cannot slip or drop load. Safety valve handle eliminates overload dangers. **Seven models** — 1,500 to 30,000 lb. capacities... factory tested at 100% overload.

HOIST-ALL

A handy all around tool for hoisting, lifting, pulling. Without its stand, it is an efficient hoist, puller, or load binder. With stand, it becomes a powerful high-lift jack. **Two sizes** — 2,000 and 4,000 lb. capacities.

SAFETY LOAD BINDERS

Powerful, highly portable, safe. Dual ratchet and pawl hold securely. Handle cannot fly up when released for another "bite." **Two models** — 3,000 and 6,000 lb. capacities.

I-BEAM TROLLEYS

Built for years of satisfactory service. **Plain or geared types.** Capacities up to 10-tons.

SPUR-GEARED CHAIN HOISTS

With extra heavy malleable iron castings, drop forged steel hooks, and special wear-resistant alloy steel in moving parts, these hoists stand up for years under the most demanding service ...factory tested at 100% overload. Automatic brake holds load securely at any position. **Seven models** — ½ to 5-ton capacities.

MIGHTY-MIDGET PULLERS

Big pulling power in a small package. Light, compact, a Mighty-Midget hangs easily on a tool belt. Handle can be used either as a lever or a high-speed crank. Two sizes. 500-lb. model weighs only 6½ lb. 1000-lb. model weighs only 9½ lb.

DIFFERENTIAL CHAIN HOISTS

Widely used in warehouses, garages, and by contractors where speed is not essential. **Four models** — ¼ to 1½ ton capacities.

COFFING HOIST COMPANY

Danville, Illinois

via Graybar

To move ahead with the POWER LOAD . . .

THE MOST *Beautiful* INDIRECT INCANDESCENT LUMINAIRE

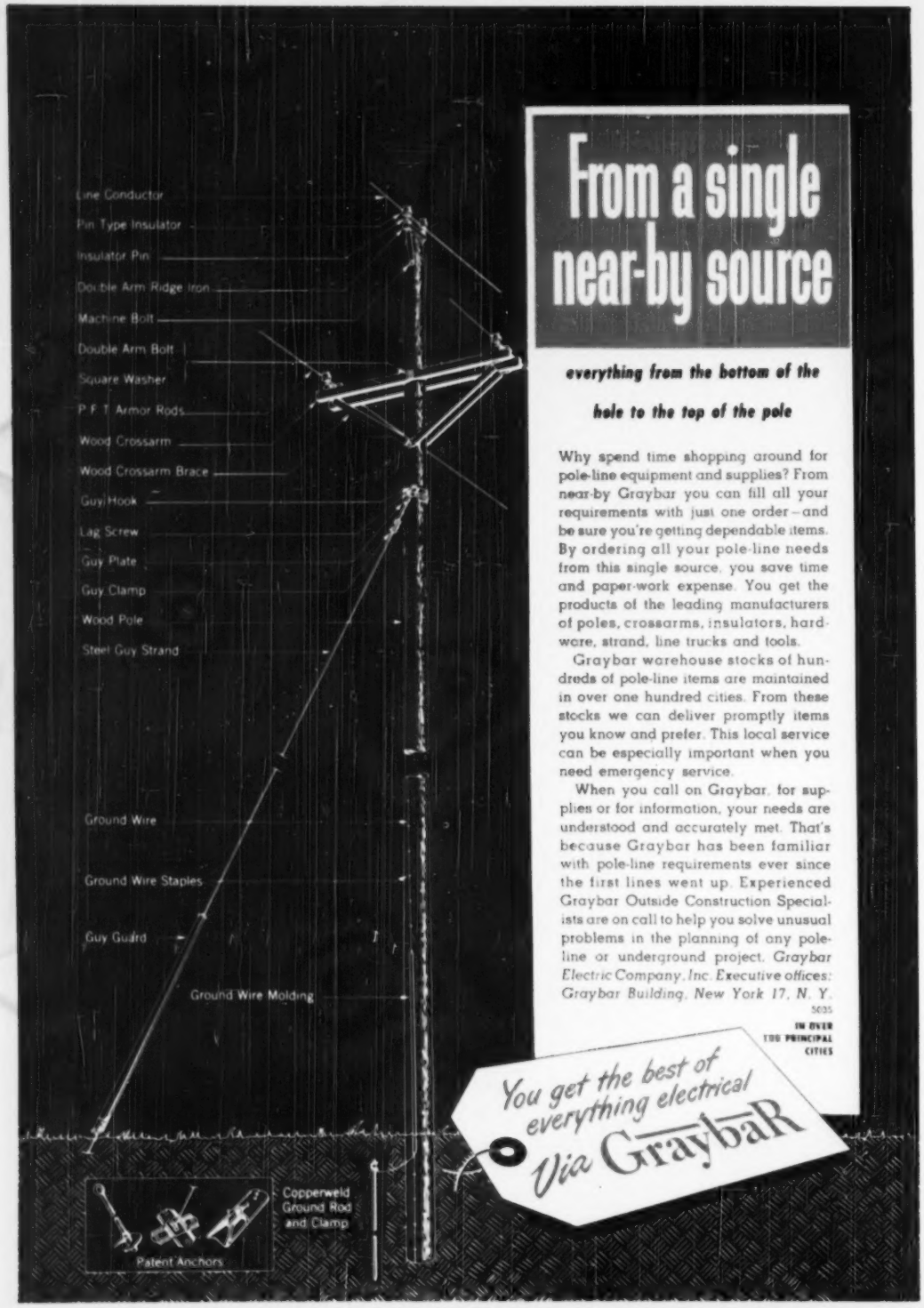
DECORATIVE ❄ EFFICIENT ❄ ECONOMICAL

Curtis SNO-FLAKE presents an entirely new concept of design for indirect incandescent illumination. It combines startling beauty with many functional features. The SNO-FLAKE'S high efficiency and economy in installation and maintenance make this excellent new unit ideal for school rooms, offices, stores, and other commercial interiors. The die-cast aluminum louver follows a pleasing geometric pattern that blends with any decorative scheme. Open top and bottom, this louver requires a minimum of maintenance. Original efficiency of the luminaire is regained with each relamping. The SNO-FLAKE utilizes either 300 or 500 watt silvered bowl lamps which assure the high effficiency demanded for modern illumination.

LIGHTING, INC., 6135 W. 65TH ST., CHICAGO 38, ILLINOIS

Full technical details and specifications on the SNO • FLAKE are illustrated and described in Bulletin No. 8. Write Dept. SF-614 for your free copy to supplement your Curtis Catalog.

Keep ahead of the INVENTORY LOAD . . . via Graybar



From a single near-by source

everything from the bottom of the hole to the top of the pole

Why spend time shopping around for pole-line equipment and supplies? From near-by Graybar you can fill all your requirements with just one order—and be sure you're getting dependable items. By ordering all your pole-line needs from this single source, you save time and paper-work expense. You get the products of the leading manufacturers of poles, crossarms, insulators, hardware, strand, line trucks and tools.

Graybar warehouse stocks of hundreds of pole-line items are maintained in over one hundred cities. From these stocks we can deliver promptly items you know and prefer. This local service can be especially important when you need emergency service.

When you call on Graybar, for supplies or for information, your needs are understood and accurately met. That's because Graybar has been familiar with pole-line requirements ever since the first lines went up. Experienced Graybar Outside Construction Specialists are on call to help you solve unusual problems in the planning of any pole-line or underground project. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*

5035

IN OVER 100 PRINCIPAL CITIES

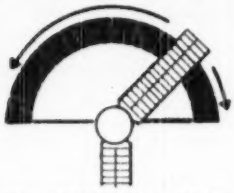
You get the best of everything electrical
Via GraybaR

via GraybaR **To move ahead with the POWER LOAD . . .**

FLUORESCENT GOES FLEXIBLE!

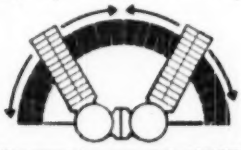
Now! For the First Time— Circles! Curves! Any Angle!

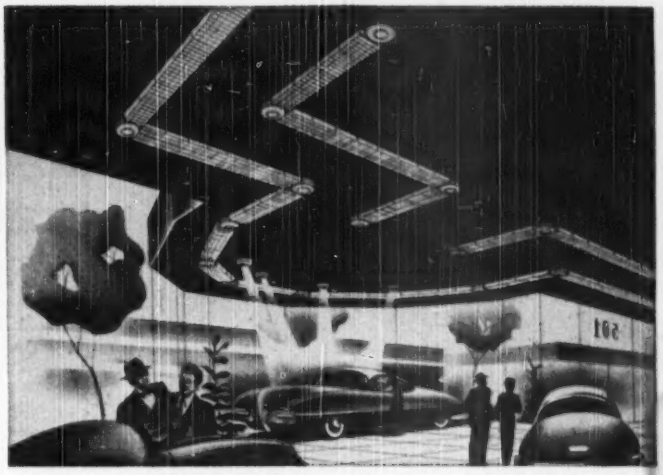
Sensationally new in concept, quality-built in the Day-Brite tradition, PLEXOLINE is making headline news. Since its recent debut, lighting experts have discovered and praised Plexoline's unprecedented ability to achieve unlimited custom-lighting effects without premium cost.



SIMPLE, PRACTICAL PRINCIPLE

Three basic elements form the PLEXOLINE system: 1. Linear section; 2. Circular accent unit; 3. Adapter fitting. The two illustrations show how the elements are used in combination to form any lighting pattern desired. All elements are complete in themselves, may be used individually.





PLEXOLINE AND IMAGINATION—AN UNBEATABLE SELLING COMBINATION!

Never before such wonderful possibilities for store and showroom lighting! Dramatic, beautiful PLEXOLINE creations put light where you want it . . . how you want it! Straight linear sections for offices, schools, colleges, banks, public buildings.

DAY-BRITE'S Plexoline

THE ONLY LIGHTING SYSTEM WITH TRULY UNLIMITED "FLEX-ABILITY"

What does PLEXOLINE mean to you? It means new freedom for your imagination. It means a line of light following a gently curving wall contour . . . angular patterns of light . . . circles . . . *any* design. It means—for the first time in history—all the advantages of custom-lighting with all the economies of a mass-produced system of fixtures.

Today, send for the whole amazing story of PLEXOLINE. Fill out and mail the coupon below. See for yourself what PLEXOLINE's unique "flex-ability" can do for you!

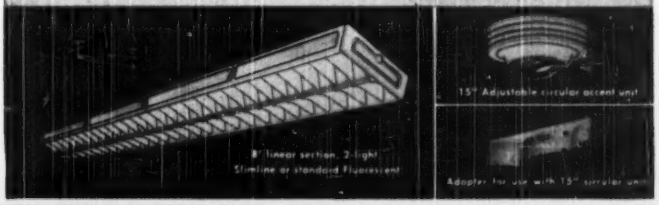
THE PLEXOLINE SYSTEM

LINEAR SECTIONS—For Slimline and standard Fluorescent, 2- and 4-light, 4', 6', and 8' lengths, surface or suspension mounted. Albalite glass side panels, interlocked steel louvers, finished in HOT-BONDED SUPER WHITE enamel.

CIRCULAR ACCENT UNITS—15" and 21" diameter, with fixed Controlens® or adjustable spot mechanism. Luminous sides. Surface mounted only.

ADAPTERS — Uniform, die-formed, all-steel—in two sizes to fit circular units.

®Holophane Co.


8' linear section, 2-light Slimline or standard Fluorescent
15" Adjustable circular accent unit
Adapter for use with 15" circular unit

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

079

Day-Brite Lighting, Inc.
5425 Bulwer Ave., St. Louis 7, Mo.
In Canada: Amalgamated Elec. Corp., Ltd., Toronto 6, Ontario

Please send me your FREE booklet, "PLEXOLINE—IMAGINATION AT WORK"

Name .....

Address .....

City ..... State .....

Keep ahead of the INVENTORY LOAD . . . via Graybar

UTILITY LIFTING JOBS MADE *QUICK* AND *EASY* WITH DUFF-NORTON JACKS

Duff-Norton Jacks save unlimited time, effort and money for light, power, street railway, railroad, telephone and telegraph companies, in maintenance of pipe lines, track, poles, bridges, heavy equipment, etc. There's a Duff-Norton Jack for every utility application. Write for data and proposal on these dependable jacks for your requirements.

CABLE REEL *Jacks*

Duff-Norton Cable Reel Jacks are standard with utility companies for lifting and holding heavy cable reels, because they meet the most exacting demands of utility crews under most adverse field conditions. Weatherproof, non-rocking, they provide rapid, even lifting and lowering.

Specifications				
Jack No.	Capacity Tons	Height Inches	Raise Inches	Weight Pounds
1030-CR	10	30	14	110

Other reel jacks are available with multiple hooks, for handling reels of varying diameters and weights.

POLE PULLING *Jacks*

Duff-Norton Pole Pulling Jacks pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or in upright position as required. "Service" need not be interrupted when these jacks are used.

Specifications					
Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Weight Pounds
329	5	28	18	7x16	91
500	15	37½	23	10x24	250

These Duff-Norton Jacks

SAVE UTILITIES TIME • ENERGY • MONEY

- **TRENCH BRACES**
- **HYDRAULIC JACKS**
- **AUTOMATIC LOWERING JACKS**
- **PUSH AND PULL JACKS**
- **SCREW JACKS**
- **AIR MOTOR POWER JACKS**
- **MANY OTHERS THAT MEET EVERY UTILITY NEED**

• WRITE FOR CATALOG 203

DUFF-NORTON JACKS ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA. — CANADIAN PLANT, TORONTO, ONT.

"The House that Jacks Built"

via Graybar **To move ahead with the POWER LOAD . . .**

LOOK TO THREE E
for High Voltage Switches and Accessories

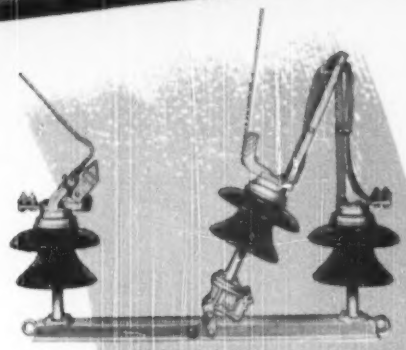
More than forty years ago the Electrical Engineers Equipment Co. began making high voltage switches and allied equipment. They have been busy making and improving them ever since.

Today their products represent the latest developments in the art of high voltage switch building.

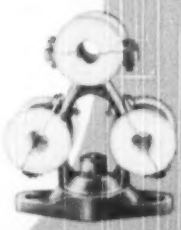
The manufacturing skills attained, and the experience accumulated over four decades can be summed up in two simple words "KNOW HOW".

THREE E HAS IT

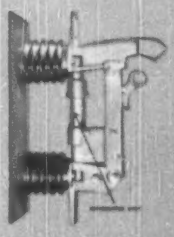
THREE E make five different types of Air Break Switches for voltages ranging from 7,500 to 230,000.



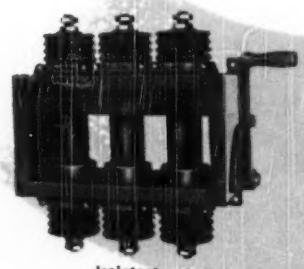
Air Break Switches



Spool Insulators



Interrupter Switches



Isolators

Disconnects

Bus Supports

Cable End Bells

The next time you need Switches, bus supports, Cable End Bells, Isolators, etc., select "THREE E"

THREE E

ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

Keep ahead of the INVENTORY LOAD . . . via GraybaR

EVERSTICK ANCHORS

FOR TOUGH ANCHORING JOBS!

Today's anchoring jobs bring Eversticks to the forefront. They provide tight, safe anchoring . . . always in excess of rated capacities. Easy and quick to install . . . made of finest grade malleable iron with superior rust-resisting qualities and exceptional toughness. Every Everstick is plainly marked for ease of handling and storing.

The nut housing feature of the Everstick prevents rod from slipping thru while installing and provides a solid substantial base for the expanding blades.

There's a complete line of Eversticks for all strain requirements. 15 sizes of 2-way—3-way—4-way types.

EVERSTICK ANCHOR CO., Fairfield, Iowa

via Graybar

To move ahead with the POWER LOAD . . .

"Our crews beat deadlines... without wasting dollars...

thanks to extra traction and proper weight distribution"

Sure, you want jobs rushed thru on schedule! But as a cost-conscious executive, you also want speed *without wasteful use of equipment capital.* And that's exactly why FWD is first choice—wherever conventional trucks have roughest going and shortest life. The FWD principle of driving power on each wheel gives you many unmatched advantages. Extra traction rolls the FWD safely and swiftly over terrain that challenges ordinary vehicles. Balanced distribution of load and power minimizes strain and wear. Maintenance and "down-time" are slashed . . . creating more *productive time* and more *productive dollars* for you!

GET FULL FACTS on 38 standardized FWD motorized units. Each combines truck and equipment into one complete, easy-to-buy package—matched to your particular needs. One central responsibility for all equipment. See Graybar or write FWD direct.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wisconsin • *Canadian Factory:* Kitchener, Ont.
World-Wide Sales and Service

Built by the Makers of America's Foremost Heavy-Duty Trucks

Keep ahead of the INVENTORY LOAD . . . via Graybar

TRUST . . . WELL PLACED

IN PROCUREMENT . . . Two fundamentals apply, always. 1. Pick yourself a reliable source of supply. 2. Specify a definite manufacturer's product, for quality's sake . . . This page displays two names to which you can pin your faith, under all circumstances. Everything you need is there — modern-specification insulation; quality-guaranteed construction; intelligent, cooperative service — "MORE POWER TO YOU".

- BARE WIRES AND CABLES
- OK®—PEERLESS®—TIP-TOP® WEATHERPROOF WIRES
- GUARDIAN® BUILDING WIRES AND CABLES—THERMOPLASTIC AND RUBBER INSULATED
- ROMEX® AND ROMEX-T, NON-METALLIC SHEATHED CABLES
- VARNISHED CAMBRIC POWER AND CONTROL CABLES, THERMOPLASTIC AND THERMOSETTING JACKETED, BRAIDED, OR LEAD SHEATHED
- ASBESTOS AND ASBESTOS VARNISHED CAMBRIC WIRES AND CABLES
- SUPER SERVICE S® AND OTHER PORTABLE CORDS AND CABLES

®TRADE MARKS REG. U.S. PAT. OFF.

GENERAL CABLE
CORPORATION

OFFICES IN PRINCIPAL CITIES

via Graybar **To move ahead with the POWER LOAD . . .**

GREENLEE HYDRAULIC CONDUIT BENDER

Here's one of the greatest timesavers you can find today for your electrical installation jobs. Many owners of the GREENLEE Bender report labor savings from 50% to 90%. . . and the cost of many manufactured bends and fittings is eliminated. For with the GREENLEE *one man* in but a few minutes makes smooth, accurate bends in rigid conduit and pipe up to 5", thin-wall conduit, tubing and bus-bars. Compact and portable, the GREENLEE Bender can be easily and quickly moved for on-the-job bending *exactly where and when wanted*. Users say it often pays for itself on the very first job. Get complete details from your electrical distributor today.

GREENLEE HAND BENDERS FOR TUBING
For quickly making small-radius bends, up to 180°, without flattening or kinks. Saves up to 75% in time and materials on many jobs. Various models and sizes to fit your work.

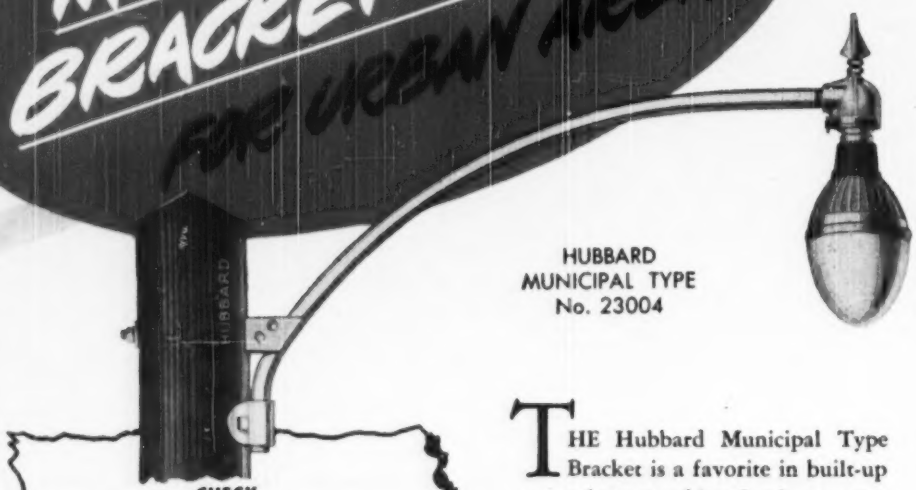
GREENLEE KNOCKOUT TOOLS AND HYDRARAM
Making smooth, accurate knockout enlargements for ½" to 4" conduit is simple, quick work with GREENLEE Knockout Punches. And it's extra easy, extra speedy with the GREENLEE HYDRARAM punch driver.

GREENLEE HYDRAULIC PIPE PUSHERS
Save hours . . . *push pipe* under streets, railways, sidewalks, lawns and floors. Eliminate extensive ditching, tearing up, backfilling, repaving. Two models: for pipe up to 4" and larger pipe or ducts.

SEE YOUR ELECTRICAL DISTRIBUTOR for information on the above and these other timesaving GREENLEE tools: Cable Pullers • Joist Borers • Electricians' Auger Bits • Bell Hangers' Drills • Bit Extensions Spiral Screw Drivers • Automatic Push Drills • and many more. Greenlee Tool Co., 1806 Columbia Avenue, Rockford, Illinois, U. S. A.

Keep ahead of the INVENTORY LOAD . . . Use GraybaR

THE MOST POPULAR BRACKET DESIGN FOR URBAN AREAS



HUBBARD
MUNICIPAL TYPE
No. 23004

CHECK
THESE ADVANTAGES

- ✓ All welded construction throughout
- ✓ Requires small pole mounting space
- ✓ Meets all EEI-NEMA lighting specifications
- ✓ "Keyhole," basic feature of pole attachment, permits installation by one man
- ✓ Simplicity of design means low cost
- ✓ Permanently aligned at factory
- ✓ "Free flowing" internal wiring—no sharp bends and no obstructions—wiring pushes through with a minimum of resistance

THE Hubbard Municipal Type Bracket is a favorite in built-up areas because of its pleasing appearance and adaptability. The bracket is internally wired and adaptable to either internally or externally wired systems. It may be installed close to the top of the pole for maximum elevation. It is easily installed by one man, comes in nominal lengths of 3, 4, 5, and 6 feet, with rises from 16 to 26 inches.

Write for Literature

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

via Graybar **To move ahead with the POWER LOAD . . .**

They never disconnect accidentally!

HUBBELL *Twist-Lock* DEVICES

Locked electrical connections are extremely important with industrial oil burners, and with heaters on equipment in the laboratory.

Twist-Lock **Devices eliminate time-losses and annoying delays because they "stay put"—are vibration-proof — assure a lockfast electrical connection under the most trying conditions — are available polarized and grounded for safe operation!**

HARVEY HUBBELL, INC. HUBBELL **BRIDGEPORT, CONN.**

Keep ahead of the INVENTORY LOAD . . . *via* GraybaR

NEW LOAD-BUILDER!

"PRV" MODEL

Power Roof Ventilator

(DIRECT-DRIVE, CENTRIFUGAL FAN TYPE)

10 sizes to operate against resistances from ¼" to 1½"

You can recommend this new power roof ventilator without reservations! It's ILG-designed, ILG-built for efficient, trouble-free exhaust from duct systems (as shown here) or from vertical flues in multi-story buildings. It has a BC type load-limiting centrifugal fan wheel with space-saving direct drive. It has a vertical type, ball bearing motor of proven ILG design . . . a weatherproof housing . . . leakproof construction. It's available with automatic or motor operated shutter, or combination shutter and variable air controller. It's easily installed, easily wired, easily serviced. And it's backed by the ILG "One-Name-Plate" Responsibility which covers the entire unit, including the motor.

ILG

Get latest data...phone or write today!

ILG ELECTRIC VENTILATING CO., 2885 N. Crawford Ave.
Chicago, Ill. • Offices in more than 40 Principal Cities.

via Graybar

To move ahead with the POWER LOAD . . .

Belt Sanders
Bench Grinders
Drills
Drill Stands
Fender Hammers
Grinders
Electric Hammers
Impact Wrenches
Nibbler
Nut Setters
Polishers
Sanders
Saws
Screw Drivers
Tappers
Valve Refacers

* AN *ELECTRIC* TOOL TO SPEED EVERY ELECTRIC JOB!

BUY IT from your DISTRIBUTOR

Write today for free E-2 universal electric tool catalog.

Here is the great new Thor "Silver Line"... the only really new, modern portable electric tools for *heavy duty* jobs. Call your Thor distributor for a demonstration. Independent Pneumatic Tool Co., Aurora, Ill.

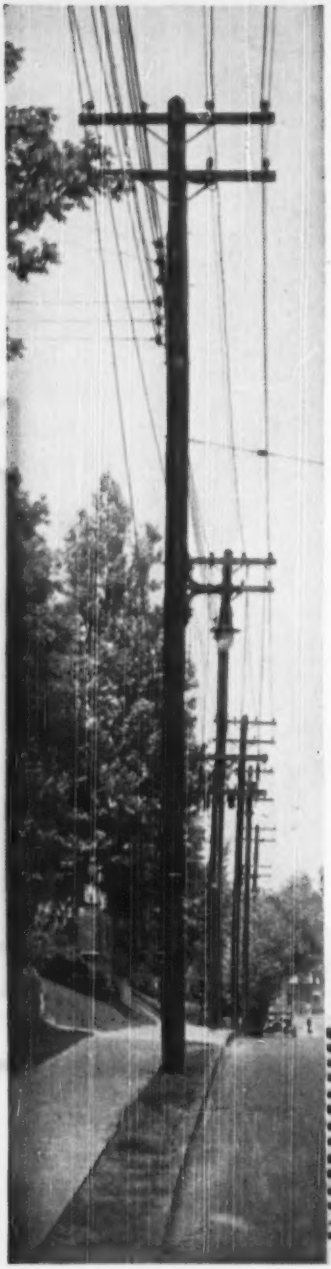
Thor TOOLS

ASK FOR THE Silver Line

Keep ahead of the INVENTORY LOAD . . . via GraybaR

DEPENDABLE *Poles* of

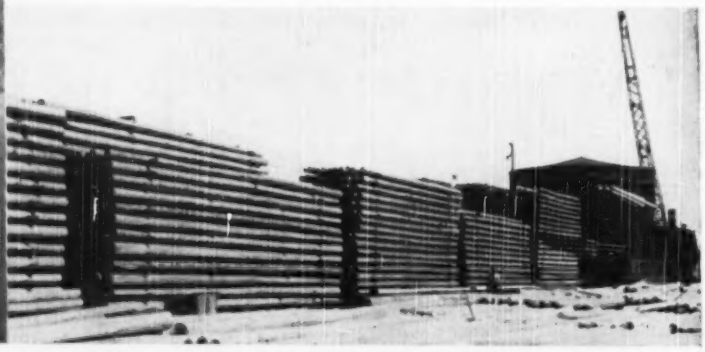
Selected Sound Timber Scientifically Treated



THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 70 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

Distributed by GraybaR Electric Company



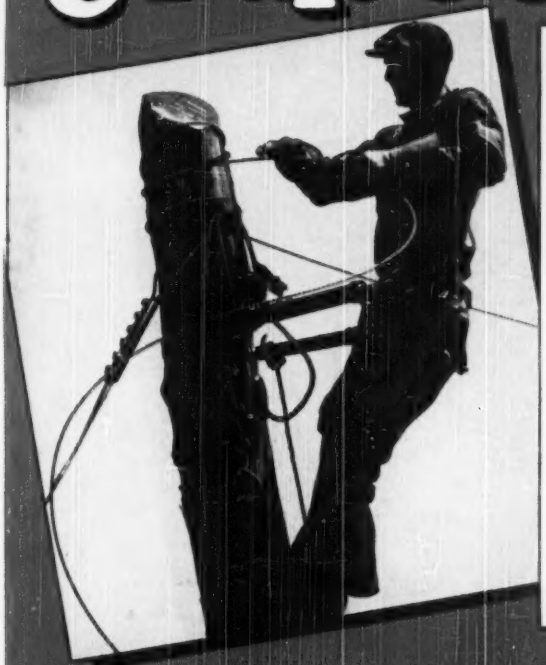
INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

via GraybaR **To move ahead with the POWER LOAD . . .**

Crapo Steel Strand



For Guys, Messenger and Overhead Ground Wire, Specify Crapo Strand!

Strength, ruggedness, workability, long-life are combined — with all-important **economy** — in Crapo Galvanized Steel Strand.

The superior tensile strength of the steel is utilized to fullest advantage in each size and grade. The heavy, ductile, tightly-adherent galvanized zinc coating — applied by the famous Crapo Process — provides dependable protection for the steel, prolongs the life of the strand.

There is a size and grade of Crapo Galvanized Strand for every practical need. Stocks are available for prompt delivery from Graybar houses throughout the country.

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

PREFORMED ARMOR RODS

Protect and Reinforce Your Conductors at Small Cost

PREFORMED ARMOR RODS provide a **simple, practical, economical** method of reinforcing and protecting overhead conductors and static wires at the point of, and in the region of, the supports.

Accurately designed and preformed to prescribed length and pitch, these spiral rods form a snug-fitting, compact, cylindrical armor over conductor or static wire. Easily and quickly installed by hand or they can be applied with special "hot-line" tools. **No clamps or clips** required.

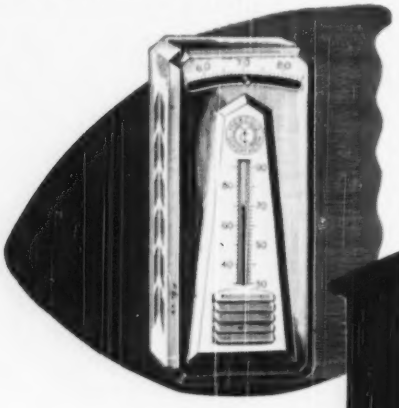
PREFORMED ARMOR RODS also are being used successfully to repair multi-stranded conductors and to reinforce worn conductors. Available in Galvanized and Stainless Steel, Aluminum, Copperweld and Copper or Bronze. Ask your Graybar representative for details!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Keep ahead of the INVENTORY LOAD . . . via Graybar

MERCOID
AUTOMATIC CONTROLS

FOR THE HOME AND INDUSTRY



1ST

IN ··· QUALITY
ACCURACY
DURABILITY
PERFORMANCE
DEPENDABILITY
SAFETY FEATURES
EASY INSTALLATION
QUICK ADJUSTMENTS
SIMPLIFIED WIRING
UNFAILING SERVICE

Complete catalog sent upon request

If you have a problem involving the automatic control of pressure, temperature, liquid level, mechanical operations, etc., it will pay you to consult Mercoid's engineering staff — always at your service.

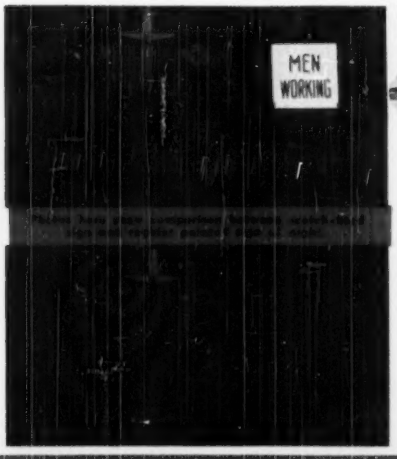
THE MERCOID CORPORATION, 4201 BELMONT AVE., CHICAGO 41, ILL.

via Graybar **To move ahead with the POWER LOAD . . .**

It Pays to Have the Right Equipment

Extension Ladders	Pike Poles	Spoons
Sectional Ladders	Pike Pole Outrigger	Steels
Diggers	Pole Supports	Tree Trimmers
Peavies	Tamping Bars	Warning Signs
Cant Hooks	Digging Bars	Folding Barricades
Carrying Hooks	Shovels	E-Z-Up Pole Cradle

NOW AVAILABLE IN "SCOTCH-LITE" in addition to regular paint background.



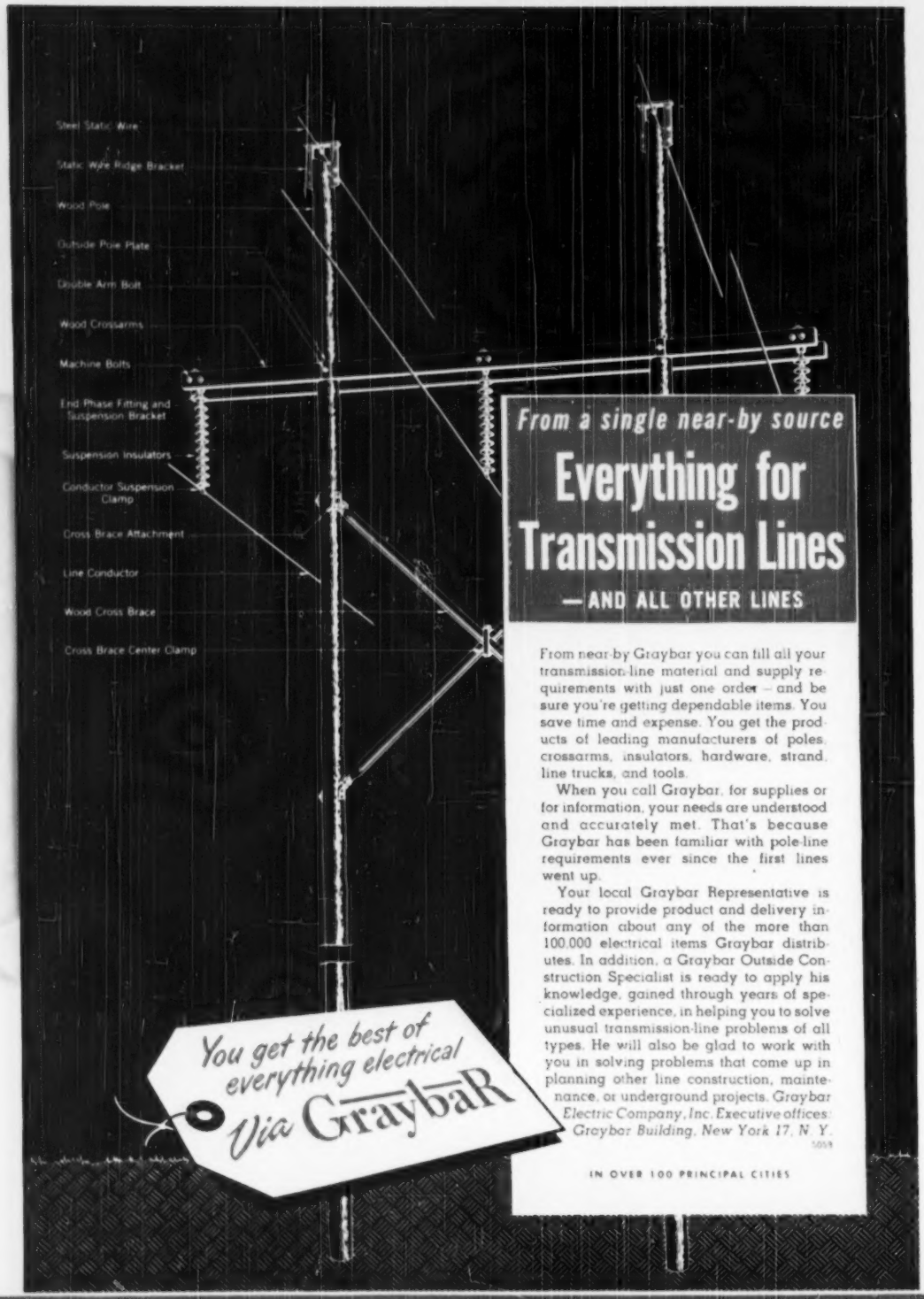
Write for full line catalog

OSHKOSH

POLE LINE TOOLS

LEACH COMPANY • Oshkosh, Wisconsin

Keep ahead of the INVENTORY LOAD . . . *via* Graybar



From a single near-by source

Everything for Transmission Lines

—AND ALL OTHER LINES

From near-by Graybar you can fill all your transmission-line material and supply requirements with just one order — and be sure you're getting dependable items. You save time and expense. You get the products of leading manufacturers of poles, crossarms, insulators, hardware, strand, line trucks, and tools.

When you call Graybar, for supplies or for information, your needs are understood and accurately met. That's because Graybar has been familiar with pole-line requirements ever since the first lines went up.

Your local Graybar Representative is ready to provide product and delivery information about any of the more than 100,000 electrical items Graybar distributes. In addition, a Graybar Outside Construction Specialist is ready to apply his knowledge, gained through years of specialized experience, in helping you to solve unusual transmission-line problems of all types. He will also be glad to work with you in solving problems that come up in planning other line construction, maintenance, or underground projects. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*

5059

IN OVER 100 PRINCIPAL CITIES

You get the best of everything electrical
via GraybaR

via GraybaR **To move ahead with the POWER LOAD . . .**

Achievement in LUXURY *lighting*

THLC-280

Leader's *Surface-Mounted THLC Fixture*

COMPANION SPOTLIGHT OPTIONALLY AVAILABLE

For use between THLC units in continuous runs, or at ends of run. Furnished with chrome-plated ball and ring assembly affording adjustment of 360° horizontal and 25° from vertical in any direction . . . or with flat Holophane* glass lens.

Consult our custom-service department if you have special requirements. We will design and build lighting fixtures to your order.

Here's a lighting fixture that emphatically proves: the secret of attaining the grand manner begins at the ceiling. A ceiling studded with Leader's luxury lighting fixture—the THLC—produces an atmospheric charm that apparently comes out of nowhere. Here is extreme beauty and quality illumination. In generous 14 7/16" width, with a smart, curved, light-diffusing Holophane* Controlens to handsomely shield two, three or four standard 48" 40-watt lamps, or Slimline lamps in various lengths up to 8 ft.

THLC SPECIFICATIONS

Housing and channel of heavy-gauge steel. Exterior finished in aluminum gray baked synthetic enamel, interior in white, high-gloss baked enamel. Furnished with curved type Holophane* Controlens (hinged for easy servicing) and curved type glass Controlens at top of exterior. Wired units include UL and ETL approved sockets and high p.f. 2-lamp ballasts, type FS easily replaceable starters. 110-125 volts, 60 cycle A.C. Other voltages and instant-start operation available on request.

Sold and installed only by the better electrical wholesalers and contractors

Leader *America's No. 1 Lighting Equipment Manufacturer*

LEADER ELECTRIC COMPANY • 3500 N. KEDZIE AVENUE • CHICAGO 18, ILLINOIS

Leader Electric — Western • 800 One Hundredth Avenue • Oakland 3, Cal.
Campbell-Leader, Ltd. • Brantford, Ontario • Canada

*Copyright Holophane Co.

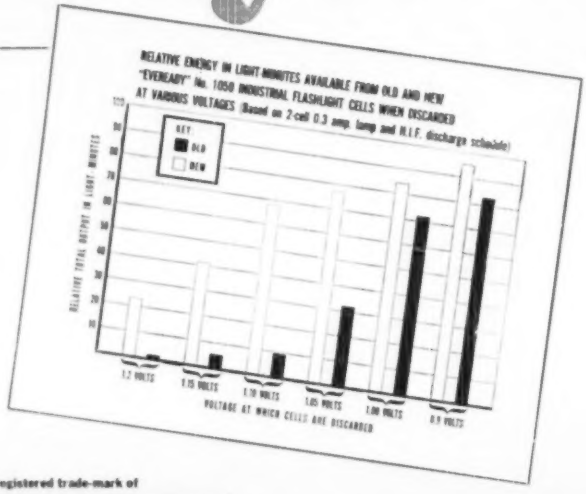
Keep ahead of the INVENTORY LOAD . . . via GraybaR

It's the NEW "Eveready" No. 1050 Flashlight Battery!

More than DOUBLE the Usable Light!

Here is the biggest news since flashlights were invented. It is a flashlight battery of completely new and different design. A battery so potent that it delivers more than twice as much usable, brilliant white light for critical uses than any other flashlight battery National Carbon has ever made. In addition, it also provides more light-energy output to the lower cut-off points. It is the new and improved "Eveready" No. 1050 flashlight battery.

This battery has no "metal can" to leak or corrode. It will not swell, stick or jam in the flashlight. Try these new batteries in your industrial and safety flashlights. Compare them with the batteries you have been using. See for yourself how much better they are . . . how much more economical to use.


RELATIVE ENERGY IN LIGHT MINUTES AVAILABLE FROM OLD AND NEW "EVEREADY" No. 1050 INDUSTRIAL FLASHLIGHT CELLS WHEN DISCARDED AT VARIOUS VOLTAGES (Based on 2-cell 0.3 amp. lamp and M.I.F. discharge schedule)
KEY:
OLD
NEW
RELATIVE TOTAL OUTPUT IN LIGHT MINUTES
1.2 VOLTS
1.15 VOLTS
1.10 VOLTS
1.05 VOLTS
1.00 VOLTS
0.9 VOLTS
VOLTAGE AT WHICH CELLS ARE DISCARDED

The term "Eveready" is a registered trade-mark of
NATIONAL CARBON DIVISION • UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.
DISTRICT SALES OFFICES: Atlanta • Chicago • Dallas • Kansas City • New York • Pittsburgh • San Francisco

via Graybar To move ahead with the POWER LOAD . . .

ONLY MITCHELL module PERFORMS THIS MIRACLE OF LOW COST CUSTOM-FITTING LIGHTING

REG. U.S. PAT. OFFICE

These 4 MODULES are the "BUILDING BLOCKS" of LIGHT

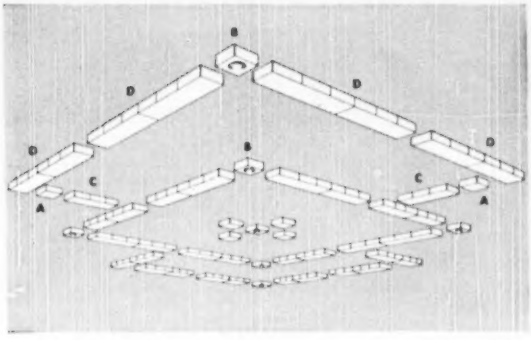
A — 4 14-Watt T-12 15" Type F Lamps

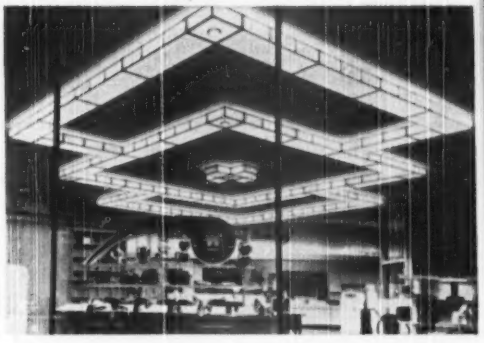
B — 32-Watt 12" Circline Lamp, and 1 PAR Spot or Flood Lamp

C — 4 40-Watt T-12 48" Type F Lamps

D — 4 75-Watt T-12 <25 Milliamp Slimline Lamps

They fit together like THIS — for lighting magic like THIS





50,000 different patterns possible—20% more light

It's amazing! With just 4 simple, low cost "building blocks of light", MITCHELL MODULE offers *unlimited* custom-fitting lighting patterns to fit any commercial interior. MODULE's exclusive plastic louver passes 20% MORE LIGHT. Simple fitting together of units (mechanically and electrically) permits low cost rearrangement of patterns at any time to suit changing needs. MODULE mixes all light sources smoothly in one harmonious, handsome system—puts the light exactly where it's needed. No ordinary fixtures can match MODULE—the *only* lighting that *custom-fits* with standard *low-cost* units.

Only MITCHELL makes MODULE

There's nothing in lighting like MODULE. It *custom-fits* and "grows" with every lighting need; it delivers *more* light; it stays beautiful, new; it costs *no more* than ordinary fixtures. If you haven't *all* the MODULE facts, *write today.*

MITCHELL MANUFACTURING COMPANY
2525 N. Clybourn Avenue • Chicago 14, Illinois
In Canada: Mitchell Mfg. Co., Ltd., 11-25 Davies Ave., Toronto

YOU SELL module INSTALLATIONS WHEN YOU TELL THIS SELLING STORY

Keep ahead of the INVENTORY LOAD . . . via Graybar

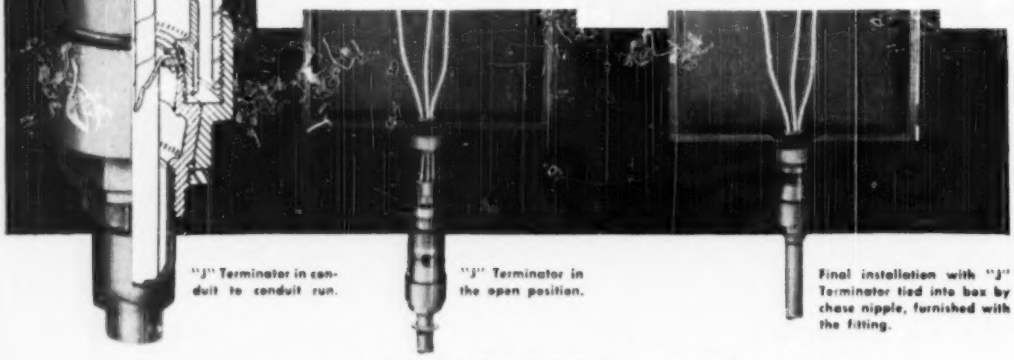
Save Money!

SEAL—TERMINATE—INSPECT
without disturbing other equipment

Use O.Z. "J" Terminators

The special collapsible design feature of O.Z. "J" Terminators saves time and effort in electrical installations . . . reduces maintenance costs. Here's how the "J" Terminator saves you money:

- **Efficiently seals and terminates conduits and cables outside cabinets.**
- **Permits subsequent inspections or current checks without circuit interruption by merely dropping sleeve.**
- **Serves as pulling and splicing chamber.**
- **Collapsible feature permits terminating conduit at enclosure, or terminating conduit and then continuing run.**



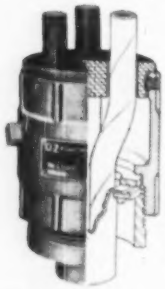
"J" Terminator in conduit to conduit run.

"J" Terminator in the open position.

Final installation with "J" Terminator tied into box by chase nipple, furnished with the fitting.

In addition to the "J", O.Z. makes a complete line of terminating potheads, compound bushings and sealing bushings for lead and rubber-covered, braided, and armored cables. With these designs, it is possible to meet all industrial requirements.

When special equipment is needed, our engineering department is prepared to cooperate with you. Write O.Z.'s Service Manager now, for a detailed catalog of electrical fittings.



TYPE "CLC" TERMINATING POTHEAD. A compact terminator designed for lead-covered cable. It seals the cable and grounds the lead sheath. Body of fitting screws directly on the conduit.

THEY'RE O.K. IF THEY'RE O.Z.

CONDUIT FITTINGS · CAST IRON BOXES · SOLDERLESS CONNECTORS
CABLE TERMINATORS · GROUNDING DEVICES · POWER CONNECTORS

O.Z. ELECTRICAL MANUFACTURING COMPANY
762 BOND STREET BROOKLYN 2, N. Y.
4286

via Graybar **To move ahead with the POWER LOAD . . .**

They go together

Nicopress TOOLS
Nicopress SLEEVES

Together they make the Perfect Splice

The National Telephone Supply Company

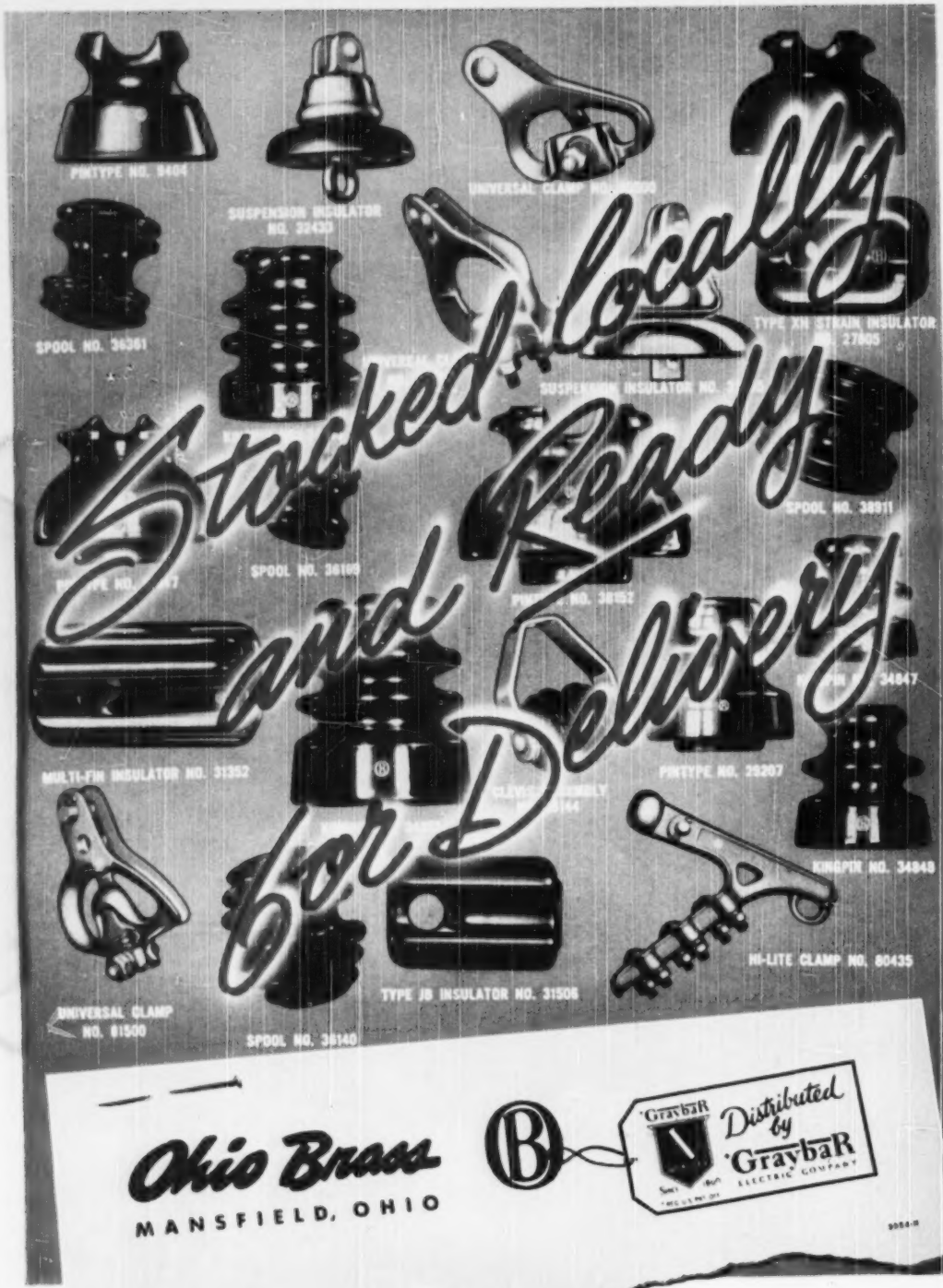
5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Nicopress is the Registered Trade Mark of The National Telephone Supply Company

Keep ahead of the INVENTORY LOAD . . . via Graybar



Ohio Brass

MANSFIELD, OHIO

Distributed by GraybaR ELECTRIC COMPANY

9084-B

via GraybaR **To move ahead with the POWER LOAD . . .**

"Here are 8 Reasons why I specify ORANGEBURG"

— says the Utility Engineer

The man in the picture symbolizes the many utility engineers who always specify Orangeburg® Conduit. And here are eight of the numerous reasons why he feels that way.

- Will not corrode. Lasts indefinitely.
- Impermeable wall and tight joints prevent corrosive ground waters from entering.
- Lays faster and at lower cost than any other type of conduit.
- Low coefficient of friction keeps pulling tensions on cable to minimum.
- Protects cable sheath from abrasion when pulled in—also from wear during cable movement due to alternate expansion and contraction with changing loads.
- Resists acids, alkalis, grease, oil.
- Light, easy to handle and tool on the job.
- Tough, resilient—will not crack or break when properly handled.

Cable HEALTH is Community WEALTH

Every industry and business prospers, every home and institution benefits from the uninterrupted flow of power through "healthy" cables. The utility engineer knows this well. Leading public utilities and municipalities therefore use Orangeburg Conduit to provide a time-defying raceway for the permanent protection of electrical services underground. Orangeburg has successfully served the electrical industry for 57 years.

And Orangeburg saves money for these users, too . . . by faster hauling, handling, tooling and laying. Costly delays on the job are further prevented by Orangeburg's complete line of bends, angle couplings, bend sections, union connections, bell ends and other standard fittings. Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

ORANGEBURG FIBRE CONDUIT

STANDARD Installed with Concrete

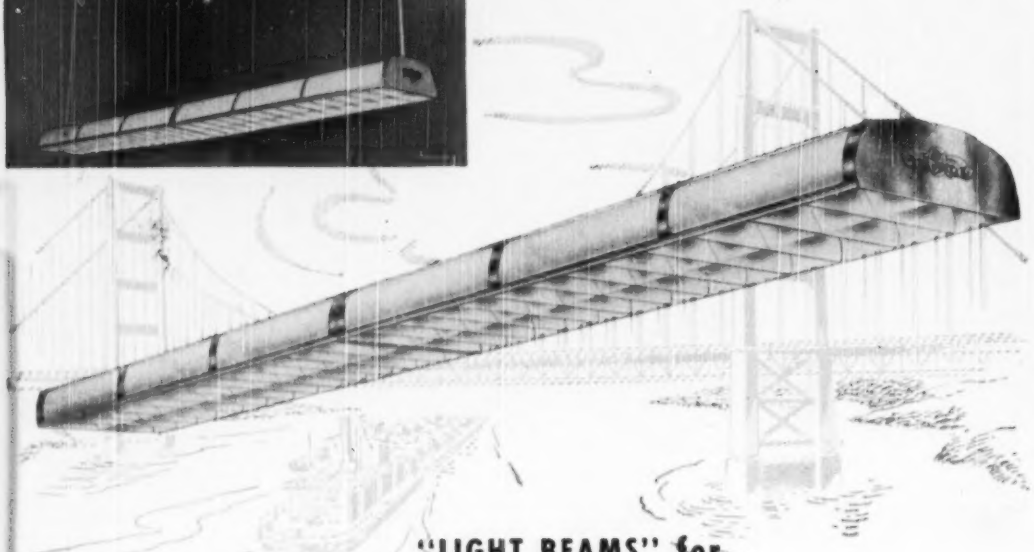
NOCRETE Installed without Concrete

Graybar ELECTRIC COMPANY

"FOR TOMORROW'S BETTERMENTS"

Keep ahead of the INVENTORY LOAD . . . via Graybar

built like a bridge



"LIGHT BEAMS" for BUILDING FOOT-CANDLE LEVELS

This actual photograph of a pendant mounted "Monroe" Slimline Luminaire proves our point that it's "built like a bridge." The "Monroe" is not recommended for heavy foot-traffic, but its bridge-like construction provides for perfect alignment on continuous runs with hangers spaced only at every 8 feet. This minimum of hangers and the unit's rugged construction mean reduced installation costs and improved appearance.

In design, in construction, in flexibility of use—the new "Monroe" is the ideal fluorescent unit. Its efficiencies of up to 83% with 25/35° shielding; its low initial cost; its long service life add up to *good lighting at economical cost.*

"The Monroe"

96" T-12 SLIMLINE and STANDARD 40-WATT LUMINAIRES

Framed-plastic, aluminum or steel side-panels; designed for quick and easy surface or pendant mounting, individually or in continuous row.

Pittsburgh Permaflector

WRITE TODAY for complete information on the "Monroe" and other Fluorescent Luminaires in the Pittsburgh Permaflector Presidential Series.

PITTSBURGH REFLECTOR COMPANY

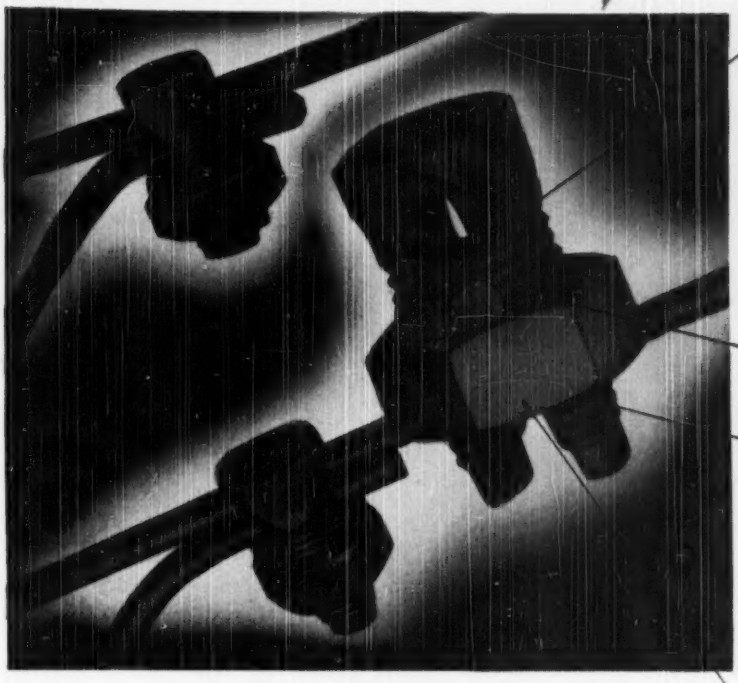
408 OLIVER BUILDING • PITTSBURGH 22, PENNSYLVANIA

Permaflector Lighting Engineers in All Principal Cities

PITTSBURGH PERMAFLECTORS ARE DISTRIBUTED BY LEADING ELECTRICAL WHOLESALERS EVERYWHERE

via Graybar **To move ahead with the POWER LOAD . . .**

Accents on Accuracy



in the manufacture of

SOLDERLESS CONNECTORS

Strong, sound alloys, not subject to heavy atmospheric corrosion, are precision-processed to provide a high percentage of thread engagement. The tough, smooth thread surfaces will not score or drag making certain of effective tightening. Only by holding each of the four critical dimensions to less than a hair's breadth can the tightening force be applied to a sufficiently large area to assure the utmost efficiency. Reliable precision processes hold all critical points to the closest possible tolerances.

1. Contacts have only a small fraction of the amount of "draft" that is considered good production practice — the entire height of contact is accurate in maintaining position of threads.

2. Slot size is held to close limits and walls of the slot are kept accurately parallel.

3. Precise limits on bolt dimensions insure a thread that is accurate in fullness, shape and contour, to fit the co-operative nut thread efficiently.

4. Forged nut of tough grain is precision tapped to give high class thread, smooth surface and high percentage of thread engagement.

POWER-LINE CONNECTORS
AND
CONSTRUCTION SPECIALTIES

Reliable ELECTRIC COMPANY
3145 CARROLL AVENUE, CHICAGO 12, ILLINOIS
OVER 40 YEARS OF SERVICE TO THE UTILITIES

Keep ahead of the INVENTORY LOAD . . . via Graybar

SQUARE D's *New*

SAFETY SWITCHES

*Types A, C and D

Backed by 40 years'

DESIGN LEADERSHIP

The remarkable superiority of this new switch line is reflected in these TYPE A design and operating features:

MODERN STYLING is both functional and attractive.

COMPACTNESS obtained without sacrifice of wiring convenience.

FULL COVER INTERLOCK has attachment that locks switch "ON" or "OFF" with 1, 2, 3 or 4 padlocks of nearly any size or shape.

SIMPLE MECHANISM—quick make-and-break action—no dead center.

SILVER-PLATED current-carrying parts.

EXPOSED BLADES permit visual checks of switch operation.

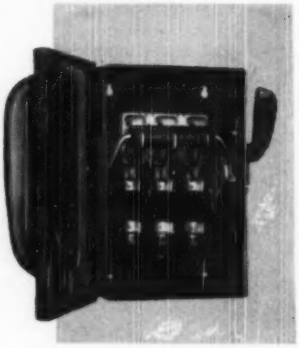
DEAD-FRONT line terminals are protected by hinged arc chamber cover.

MAGNETIC ARC PLATE adds to unusually high rupturing capacity.

POSITIVE PRESSURE jaws and fuse clips, steel reinforced, silver-plated.

NON-TRACKING insulation used in base. Melamine insulating cross-bar.

REMOVABLE PRESSURE CONNECTORS permit substitution of solder lugs, where preferred.



Types **C and **D** similar to Type **A** in appearance—differ in construction details*

SAFETY SWITCHES and other Square D Products are distributed by GRAYBAR

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

via Graybar

To move ahead with the POWER LOAD . . .

Simplex Presents... 4 CABLES that CUT DISTRIBUTION COSTS and INCREASE CONTINUITY of SERVICE

SIMPLEX-ANHYDREX CABLES

Insulated with Anhydrex and jacketed with neoprene to provide sound electrical properties and protection against abrasion, acids, alkali, oils, flame, sunlight and weathering, **plus** unequaled stability when exposed to water and moisture. Can be buried directly in earth, installed in ducts and conduit, or run through open air. Easy to install, splice, and terminate. Not subject to electrolysis and corrosion. Ideal for transmission and distribution systems, signal and control circuits, industrial power lines, street, park, and airport lighting, series lighting circuits, and underground service entrance. Write for Catalog 1013.

SIMPLEX-ANHYDROPRENE CABLES

Consist only of a coated copper conductor, Anhydrex insulation, and a thin jacket of neoprene. Light in weight and small in diameter. Can be used in open air or raceways in buildings, in conduit, and underground in ducts. Recommended for underground primaries and secondaries, transformer leads, pole line risers, instrument wiring, plant wiring, and for signal and control circuits. Write for Bulletin 115.

Simplex Polyethylene-Plastex Cables

Lightweight, small-diameter cables for signal, communication, and supervisory control circuits. Polyethylene insulation features thin wall, high dielectric strength, high insulation resistance, and low water absorption. Its low power factor and dielectric constant assure low attenuation, low capacitance and maximum transmission distances. Plastex jacket is resistant to oxidation, flame, oil, water, sunlight, and weathering. It remains stable over a temperature range of about 200 degrees Fahrenheit and it resists cracking down to −58°F. Available in three types adapted to underground, duct, conduit, and aerial installations. Write for Catalog 1010.

SIMPLEX VARNISHED CAMBRIC CABLES

For power circuits, apparatus and equipment leads, switchboard wiring, and vertical distribution in central stations and industrial plants. Designed for operation at copper temperatures as high as 185°F. Will withstand exposure to mineral oil, heat and ozone. Available in single or multi-conductor types, with either braided, rubber, or lead coverings. Write for Bulletin 108.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Keep ahead of the INVENTORY LOAD . . . via GraybaR

Pull Any Size Pole *Easier*

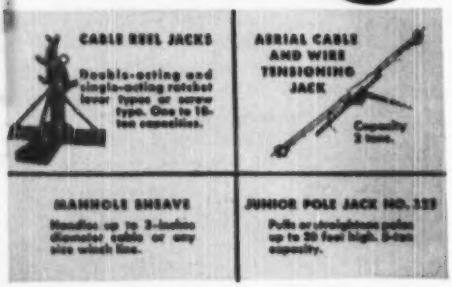
with the NEW *Light-Weight*

SIMPLEX ALUMINUM POLE JACK

No. A-329

15 Ton Capacity . . . WEIGHS ONLY 60 POUNDS!

POWERFUL! **RUGGED!** **DEPENDABLE!**


CABLE REEL JACKS
Double-acting and single-acting ratchet lever types or screw type. One to 10-ton capacities.
AERIAL CABLE AND WIRE TENSIONING JACK
Capacity 2 tons.
MANHOLE SHEAVE
Handles up to 3-inches diameter cable or any size winch line.
JUNIOR POLE JACK NO. 323
Pulls or straightens poles up to 30 feet high. 5-ton capacity.

Here's the first time and labor saving improvement in pole jacking in 25 years! New aluminum housing on The Simplex heavy-duty Pole Jack eliminates 35 pounds of weight, without sacrificing a pound of lifting capacity. You can pull or straighten poles, pull butts or move loaded poles without interruption to service — and without digging. Only 60 pounds in weight, it's easy to move from job to job; saves time and work.

This new Simplex No. A-329 Aluminum Pole Jack has the better-performance and long-lasting construction features that made its predecessor — the famous Simplex No. 329 with malleable housing — the standard Pole Jack of the Bell Systems. The husky "I" beam base gives a firm foundation; jack pivots on the base when pawl is disengaged. The A-329 has 15-ton capacity and 22-inch lift. Comes completely equipped with steel chain and lever bar.

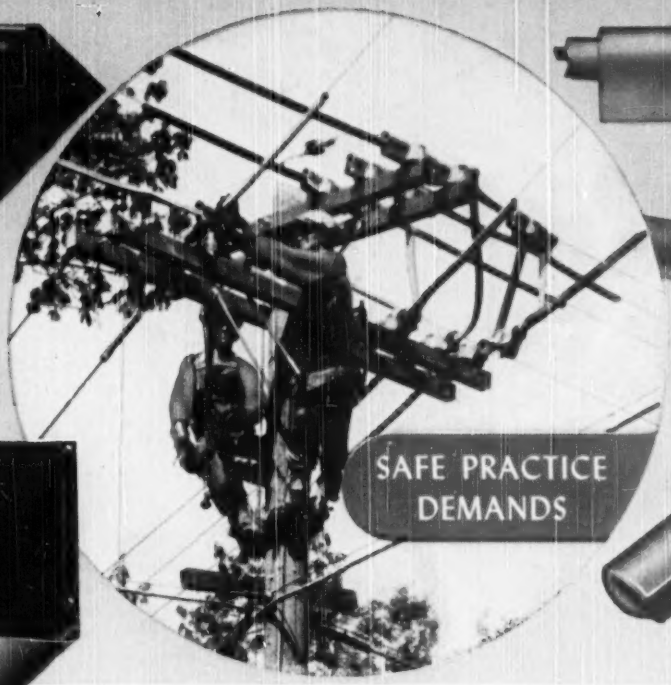
Get full information now from your Graybar Branch, or write for Catalog No. 50

Simplex LEVER · SCREW · HYDRAULIC Jacks

TEMPLETON, KENLY & COMPANY
1046 South Central Avenue, Chicago 44, Illinois

via Graybar **To move ahead with the POWER LOAD . . .**

A DEVICE FOR EVERY ELECTRICAL HAZARD



SALISBURY

RUBBER PROTECTIVE DEVICES

• For linemen and others who work on or near energized equipment . . . Approved by safety engineers from coast to coast . . . Adopted for safety by public utility companies everywhere . . . Designed for maximum dependability and convenience in use . . . Made from highest grade materials by the pioneers in manufacture of rubber protective equipment for linemen . . . *Write for Catalog L-4.*

W. H. SALISBURY & CO.

GENERAL OFFICE AND FACTORY
401 NORTH MORGAN STREET, CHICAGO 22

Keep ahead of the INVENTORY LOAD . . . via Graybar

LOWER YOUR COST!

Install

T&B

PRESSURE CONNECTORS *and* TERMINALS

UL
UNDERWRITERS LISTED

2,000,000 CM

TO #22 AWG

and every size between!

*PATENTED

THE THOMAS & BETTS CO.
INCORPORATED
ELIZABETH 1 NEW JERSEY

via Graybar

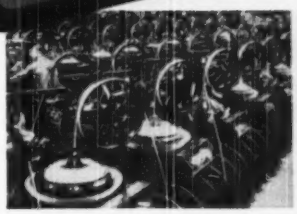
To move ahead with the POWER LOAD . . .

Prove to your own satisfaction, as others have, that "Glazon" is the building wire for your jobs. Prove to yourself that it pulls easier . . . twists around bends more flexibly . . . handles better than any other building wire you've ever used!

Prove, too, that "Glazon" means longer life . . . better protection . . . greater resistance to exposure and deterioration. And prove to yourself what others have learned: that "Glazon's" easier handling and longer life—at no extra premium—all add up to today's greatest building wire value!

What "Glazon" Is:

"Glazon" incorporates a tougher, smoother, longer lasting braid based on continuous filament glass yarn—which cannot rot, burn, absorb moisture or deteriorate with age. Special saturants bond permanently to individual fibers, setting new standards of resistance to moisture, fire and rot. Result: smaller diameter, greater flexibility, smoother surface—in short, vastly improved fishability...combined with still longer life.



The Right Combination—"Glazon" protective coverings combine carefully controlled braiding, specially developed saturants—and manufacturing technique exclusive with Triangle. "Glazon" means building wire at its best!

The Trade Mark Of Top Value

TRIANGLE CONDUIT & CABLE CO., INC.

1900 JERSEY AVENUE • NEW BRUNSWICK, NEW JERSEY

IT *MUST* BE RIGHT!

"Glazon" & "Triseal" Building Wire • "Tricon" Control Wire • "Adaptal" General Purpose Wire • "Trilex" Non-Metallic Sheathed Cable • "Trioprene" Trench Cable • Service Entrance, Parkway, Power & Varnished Cambric Cables • "Tristeel" Flexible, Thin Wall & Rigid Steel Conduit

Keep ahead of the INVENTORY LOAD . . . via Graybar

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. *What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?*

A. UNITED STATES RUBBER COMPANY.

Q. *What ONE wire and cable producer makes plastics?*

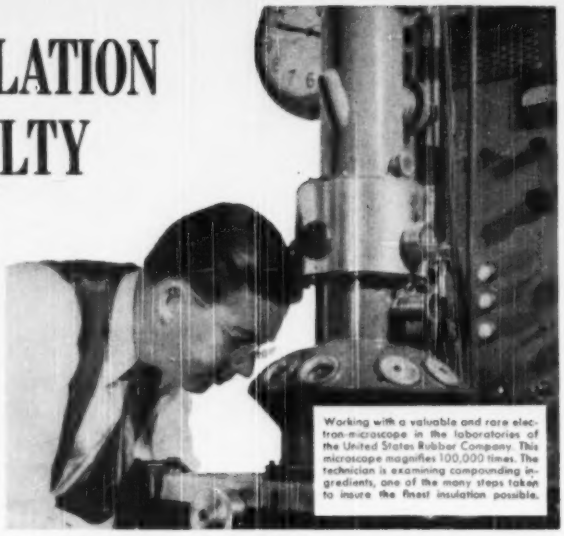
A. "U. S."

Q. *What is the most important part of wire and cable?*

A. The insulation.

Q. *Who is best equipped to make wire and cable with superior insulation?*

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.



Working with a valuable and rare electron-microscope in the laboratories of the United States Rubber Company. This microscope magnifies 100,000 times. The technician is examining compounding ingredients, one of the many steps taken to insure the finest insulation possible.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

BUILDING: Laytex RU—world's smallest diameter, lightest weight natural rubber covered building wire. **Neolay RU**—with Laytex insulation plus Neoprene; nylon cover makes pulling 5 times easier. **Laytex RUW**—with the insulation resistance that increases in wet locations.

Neoprene Covered Service Entrance Cable—Flame-retardant, moisture resistant—first ever accepted by Underwriter's Laboratories, Inc. **Aluminum Wires and Cables. Cord Sets with Electrix Plugs.**

HEAVY INDUSTRY: Power Cables—of every description including Neolay Aircraft Wire. **Royal Master Portable Cords. Royal Mining Machine and Locomotive Cables**—tested seven different ways to insure complete dependability. **Control Wires**—insulated with Laytex RU for greater circuit integrity. **Municipal Signal Cables**—Insulated with Laytex RUW for maximum moisture-resistance. **Welding Cables • Machine Tool Wire • Switchboard Wire • Thermostat Cable • Bus Drop Cable.**

HERE'S WHY U. S. RUBBER INSULATION "KNOW HOW" MAKES THE WORLD'S BEST BUILDING WIRE

Six No. 14 Type R wires fit in ordinary conduit

Eleven No. 14 Laytex Type RU wires fit in same size conduit (Rewiring only)

MORE WIRES PER CONDUIT

U. S. Laytex RU Building Wire is smaller in diameter than ordinary wires. Its insulation is applied with uniform thickness, resulting in perfect centering and no thin spots. A unique dip or pass method, perfected by U. S. Rubber Company, applies 90% pure rubber to the conductors, eliminating the usual bulkiness and weight. On rewiring jobs, eleven No. 14 Laytex Type RU wires fit in a conduit that ordinarily would hold only six No. 14 Type R wires. A special wax finish makes this wire 33⅓% to 300% easier to pull than the average, according to laboratory tests.

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE & CABLE DEPT. • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

via Graybar

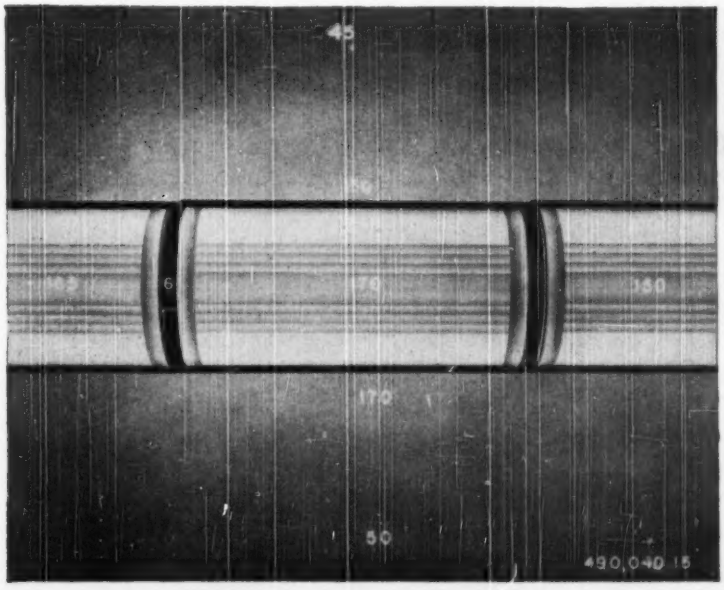
To move ahead with the POWER LOAD . . .

How To Create A Modern Office

conforming to I. E. S. Recommended Practice of Office Lighting

How an office was designed, decorated and lighted to achieve reflectances, brightnesses and brightness ratios meeting or bettering (except in one instance: the reflectance of the floor covering is too low) all requirements of I.E.S. Recommended Practice of Office Lighting is told in detail in this 8 Page Engineering Survey by an independent consulting illuminating engineer. Write for your copy to

THE F. W. WAKEFIELD BRASS COMPANY, VERMILION, OHIO.



ANOTHER WAKEFIELD STAR INSTALLATION

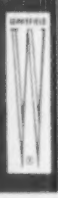
The office described in the Engineering Survey is lighted by 4 continuous rows of Wakefield STARS, each luminaire containing four 4300° white slimline fluorescent lamps 72 inches long. Taken from the Survey is this view looking vertically upward from underneath a luminaire. The Survey says: "This is the brightness pattern that would be reflected by a glossy desk top located under the luminaire. The low brightnesses and brightness ratios found here prove that reflected glare is not a problem in this office." The STAR has a luminous, indirect plastic reflector which slides in and out like a drawer.

GraybaR Distributed by GraybaR ELECTRIC COMPANY

SEE YOUR GRAYBAR HOUSE

Wakefield Over-ALL Lighting

A BASIC OFFICE TOOL

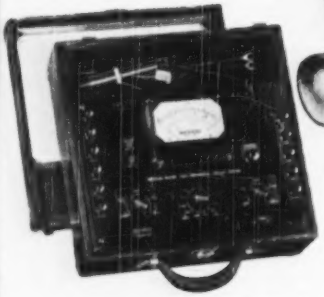


Keep ahead of the INVENTORY LOAD . . . via GraybaR

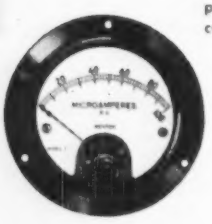
TO KEEP Ahead of Trouble

Self-shielded, easily read, Weston Model 901 Portable Instruments tolerate wide temperature fluctuations, stay accurate to ½ of 1%.

When the warning flags are flying it pays to be prepared, at sea or ashore. To keep ahead of trouble on your electrical equipment, rely on Weston Instruments to warn of approaching trouble . . . to isolate circuit faults . . . to assure trustworthy repairs. Weston Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.



For accurate circuit analysis, use the ultra-sensitive Weston Model 785 Industrial Circuit Tester. It provides 28 AC and DC voltage, current and resistance ranges.



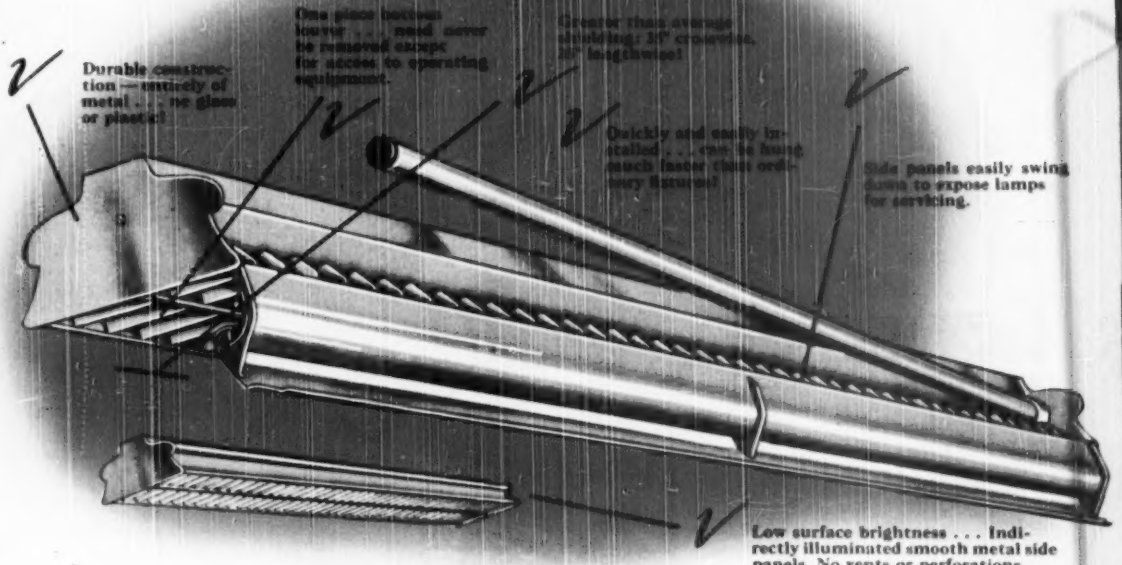
All AC and DC requirements are met by the extensive Weston line of Panel and Switchboard Instruments.

Measuring voltage and current on insulated or bare conductors is quick and easy with the Weston Model 633 AC Clamp Volt-Ammeter.

WESTON *Instruments*

via GraybaR **To move ahead with the POWER LOAD . . .**

Wheeler deserves to be HUNG!


Durable construction — entirely of metal . . . no glass or plastic!
One glass bottom louver . . . need never be removed except for access to operating equipment.
Greater than average shielding: 35° crosswise, 45° lengthwise!
Quickly and easily installed . . . can be hung much faster than ordinary fixtures!
Side panels easily swing down to expose lamps for servicing.
Low surface brightness . . . Indirectly illuminated smooth metal side panels. No vents or perforations. Makes cleaning easier . . . faster!

Here it is — the perfect fixture for Commercial Lighting! This new Wheeler O. C. Slimline unit is the answer for illuminating Offices, Schoolrooms, Stores, Drafting Rooms, Hospitals and Public Buildings. Attractive, economical and efficient.

Made for use with two 75 watt, 96" T12 Slimline lamps and two 40 watt, 48" T12 single pin lamps. Write Wheeler Reflector Company, 275 Congress St., Boston 10, Mass. . . . Also New York, N. Y. Representatives in principal cities.

O. C.

OCULAR COMFORT

Distributed Exclusively Through Electrical Wholesalers

Wheeler REFLECTORS

Keep ahead of the INVENTORY LOAD . . . via Graybar

At the near-by GraybaR warehouse there's an inventory of thousands of items:

Poles	Hardware
Crossarms	Tools
Strand	Line Trucks
Insulators	Connectors

Protective Devices

For facts CALL OUR NEAREST OFFICE

via GraybaR

ALABAMA
Birmingham

ARIZONA
Phoenix

ARKANSAS
Little Rock

CALIFORNIA
Fresno
Long Beach
Los Angeles
Oakland
Sacramento
San Diego
San Francisco

COLORADO
Denver

CONNECTICUT
New Haven
West Hartford

DELAWARE
Wilmington

DISTRICT OF COLUMBIA
Washington

FLORIDA
Jacksonville
Miami
Orlando
Tampa

GEORGIA
Atlanta
Savannah

IDAHO
Boise

ILLINOIS
Chicago
Peoria

INDIANA
Evansville
Hammond
Indianapolis

IOWA
Davenport
Des Moines

KANSAS
Wichita

KENTUCKY
Louisville

LOUISIANA
New Orleans
Shreveport

MAINE
Portland

MARYLAND
Baltimore

MASSACHUSETTS
Boston
Springfield
Worcester

MICHIGAN
Detroit
Flint
Grand Rapids
Lansing

MINNESOTA
Duluth
Minneapolis
St. Paul

MISSISSIPPI
Jackson

MISSOURI
Kansas City
St. Louis

MONTANA
Butte

NEBRASKA
Omaha

NEW HAMPSHIRE
Manchester

NEW JERSEY
Newark

NEW YORK
Albany
Binghamton
Buffalo
Jamestown
New York
Rochester
Syracuse

NORTH CAROLINA
Asheville
Charlotte
Durham
Winston-Salem

OHIO
Akron
Cincinnati
Cleveland
Columbus
Dayton
Toledo
Youngstown

OKLAHOMA
Oklahoma City
Tulsa

OREGON
Eugene
Portland

PENNSYLVANIA
Allentown
Harrisburg
Philadelphia
Pittsburgh
Reading

RHODE ISLAND
Providence

SOUTH CAROLINA
Columbia

SOUTH DAKOTA
Aberdeen

TENNESSEE
Bristol
Chattanooga
Knoxville
Memphis
Nashville

TEXAS
Amarillo
Austin
Beaumont
Corpus Christi
Dallas
El Paso
Ft. Worth
Houston
San Antonio

UTAH
Salt Lake City

VIRGINIA
Norfolk
Richmond
Roanoke

WASHINGTON
Seattle
Spokane
Tacoma

WEST VIRGINIA
Charleston

WISCONSIN
Milwaukee

New Equipment

(*Continued from page 146*)

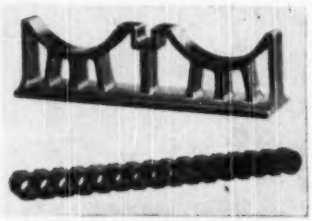
resin, is capable of withstanding high temperature and high pH range.

Alkalinity and silica may be minimized and hardness removed by passing the raw water first through a Permutit hot process softener and second through the Permutit Q, where residual calcium and magnesium are reportedly removed from the effluent.

Laboratory tests are said to show that boiling water, with a pH above 10, does not seriously affect the Permutit Q even after it has been regenerated 1,300 times.

The Permutit Co, 330 W. 42nd St, New York 18, N. Y.

•



Base and Bend Spacer Bar

AN INTEGRAL feature of a new base spacer (at top in illustration) is the center loop through which a tinned copper or similar wire may be run for grounding the entire installation. The spacer has a 3-in. bottom which is reported to assure a firm foundation and maintain the desired gradient of a duct installation before concrete is poured. It is available in sizes for 2, 3, 4, 4½, and 5-in. conduit.

The bend spacer bar is 20 in. long and 1½ in. square, serving primarily as a duct installation leveller, horizontally or vertically. Both spacer bars are made of similar asphalt and asbestos fiber material.

Line Material Co, Milwaukee 1, Wis.

MORE NEW PRODUCTS
about which you should know

DEARBORN CHEMICAL CO, 310 S. MICHIGAN AVE, CHICAGO 4, ILL., offers the Chromokit for performing on-the-spot chromate **strength tests** on diesel cooling water. Method involves comparison of chemically impregnated test cards with a standard color guide. . . . HEYMAN MFG CO, 100 MICHIGAN AVE, KENILWORTH, N. J., is producing a strain relief **bushing adapter** which fits into standard knockout-holes.

RADIO CORP OF AMERICA, CAMDEN, N. J., is producing a two-stage bridging **power amplifier** for use in high-power industrial and commercial sound systems. . . . GRAPHITE METALLIZING CORP, 1050 NEPPERHAN AVE, YONKERS 3, N. Y., is marketing Silver Graphalloy **brushes** in which molten silver is forced into the graphite. The brushes are for uses involving high-speed slip rings, commutators, scanners, etc.

POTTER INSTRUMENT CO, INC, 136-56 ROOSEVELT AVE, FLUSHING, N. Y., has announced a high-speed Teledeltos **paper recorder** for use with the company's electronic counters. Count is transferred to the paper after each measurement, and the counter reset. . . . VACO PRODUCTS CO, 317 E. ONTARIO ST, CHICAGO 11, ILL., has a **screw driver** with a built-in flashlight to illuminate screw heads obscured by shadows.

AMERICAN HOIST & DERRICK CO, ST. PAUL 1, MINN., has developed a **fairleader** for applications where an off-lead is necessary or where more universal swiveling is required than is possible with a snatch block. . . . . PLOMB TOOL CO, LOS ANGELES CALIF., has added 12 **torque wrenches** designed so that the operator releases the wrench at the desired torque setting; capacities range from 300 in.-lb to 300 ft-lb.

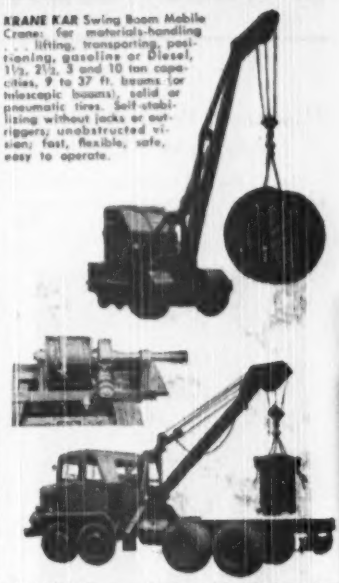
IRVINGTON VARNISH & INSULATOR CO, FIBRON DIV, IRVINGTON 11, N. J., is producing "Ivithene" from polyethylene extrusions for use as electrical **insulations**, liners, protective sheeting, etc. . . . NATIONAL ELECTRIC PRODUCTS CORP, CHAMBER OF COMMERCE BLDG, PITTSBURGH 19, PA., offers a 3¼-in. Redege octagon **outlet box** to accommodate armored cable, non-metallic sheathed cable, and flexible tubing.

GENERAL ELECTRIC CO, ELECTRONICS PARK, SYRACUSE, N. Y., is manufacturing a 10-w mobile radio **transmitter** ES-12-A for utilities and construction industries, designed for adjacent channel operation in urban and metropolitan areas. . . . NECO MFG CO, INC, AUBURN, IND., has a display **sign** with interchangeable neon letters that plug in like radio tubes; 110 v ac.

MINE SAFETY APPLIANCES CO, BRADDOCK, THOMAS AND MEADE ST, PITTSBURGH 8, PA., is marketing its Velocity-Power Driver featuring a spring-impelled firing pin for **firing a stud-cartridge unit**; can be used to install electrical equipment, pipe and duct hangars. . . . MILWAUKEE ELECTRIC TOOL CORP, 5316 W. STATE ST, MILWAUKEE 8, WIS., has a 3-speed **drill**, Type S-412, for continuous drilling in hard-to-get-at-places; weighs 8 lb.

Utilities Have Specified
SILENT HOIST Equipment
• Since 1918 •

KRANE KAR Swing Boom Mobile Cranes: for materials-handling . . . lifting, transporting, positioning, gasoline or Diesel, 1½, 2½, 3 and 10 ton capacities, 9 to 37 ft. booms (or telescopic booms), solid or pneumatic tires. Self-stabilizing without jacks or outriggers; unobstructed vision; fast, flexible, safe, easy to operate.



WINCHES: Capstans; Single and Double Drum, Jaw Clutch, Keyed and Friction Clutch Winches. 2,000 to 50,000 lb. Capacities.

SWING BOOM CRANES: Truck; Motor Power Operated; high capacity; takes up only a small space. For handling transformers, cable reels, lamp posts, trees, poles, manhole castings, etc. 9 to 31 ft. booms; one to 10 ton capacities.

TOWERS: 2 or 3 section type and Pantograph types, with plain, revolving or rocking platforms.

TRIPOD POLE DERRICKS: for 35 ft., 45 ft., and 60 ft. Poles; single piece or telescopic side legs; removable cast steel fittings.

USERS: AT&T; N. Y. Tel. Co.; T.V.A.; Consolidated Edison Co.; W.U.; Municipalities throughout America.

WRITE FOR CATALOGS:
No. 79—KRANE KAR *No. 70—Truck Equipment*

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT WHEEL DRIVE AND REAR-WHEEL STEER
½, 2½, AND 10 TON CAPACITIES
KRANE KAR
SILENT HOIST & CRANE CO.
342 43rd ST., BROOKLYN 20, NEW YORK

NEWS ABOUT PEOPLE

Minnesota Power & Light Advances 3 Executives

Clay C. Boswell has been elected vice president and assistant general manager of Minnesota Power & Light Co, Duluth. Franklin S. Rice has been appointed chief engineer and Hobbell Carpenter assistant chief engineer.

CLAY C. BOSWELL

Boswell has been vice president since 1940 and a director since 1936. He joined the utility in 1929 as assistant chief engineer and in 1934 was made chief engineer, succeeding L. M. Pharis, who left Duluth to join Shanghai Power Co, Shanghai, China.

Boswell's first utility job was in 1915 when he became a substation and power plant operator and maintenance man for Utah Power & Light Co. Later he was named assistant to the commercial manager. In 1923 he went to New York City as assistant to one of Electric Bond & Share Co's operating and financial sponsors, working on operating, engineering, construction, and financial problems of Utah P&L, Idaho Power Co, Western Colorado Power Co, Minnesota P&L, and Superior Water, Light & Power Co.

Rice joined Great Northern Power Co, a Minnesota P&L predecessor, as operating engineer in 1916. When Minnesota P&L was formed in 1923 he became its electrical engineer, and in 1934 he was appointed assistant chief engineer. Before going to Minnesota, Rice worked for General Electric Co in Boston and Schenectady.

Carpenter went to Superior, Wis., in 1940 as resident engineer for Ebasco

FRANKLIN S. RICE

Services, Inc, on a new generating unit at the Winslow steam station of Superior Water, Light & Power. The next year he served as Ebasco's resident engineer on installation of a 25,000-kw generating unit at the M. L. Hibbard steam station in Duluth. In 1944 he joined Minnesota P&L in engineering work and in 1947 became superintendent of special construction in charge of installation of new generating equipment in Duluth. Before going to the Midwest he worked for Idaho Power and did construction work for Ebasco in several Western states.

•

Lanphier Directs Sales, Engineering at Sangamo

C. H. Lanphier, vice president of Sangamo Electric Co, has been appointed director of engineering and sales following unification of the two departments.

F. C. Holtz, vice president and chief engineer, has been named technical director of the engineering department to serve as a consultant to the engineering and sales staffs and to Sangamo's customers. E. A. Leach, administrative engineer, will serve as liaison to Lanphier in the administration of the engineering department.

J. S. Martin, assistant chief engineer, will provide engineering consultation to the staff and laboratory. Named executive engineers were C. J. Armstrong, mechanical devices; W. C. Downing, Jr, thermal devices; F. Kurz, watthour meters; and W. W. Sherwood, electronic apparatus.

Lanphier joined the company in 1931 and has served as engineering assistant, assistant general superintendent, assistant to the president, treasurer, and vice president.

•

Oklahoma G&E Elects Ferrin Vice President

Horace H. Ferrin, since 1947 treasurer and assistant secretary of Oklahoma Gas & Electric Co, has been elected vice president and treasurer.

H. H. FERRIN

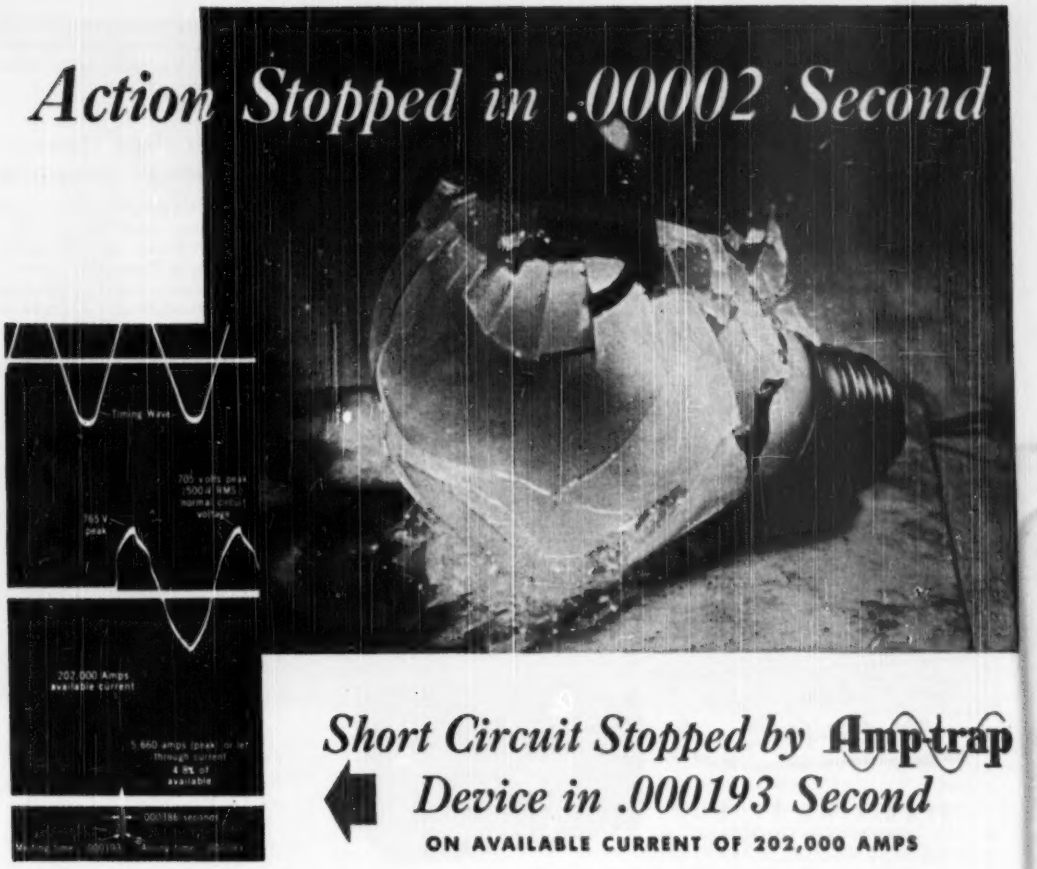
Ferrin joined OG&E in 1926. After serving two years in Shawnee as a clerk and accountant he was transferred to Oklahoma City to specialize in analytical studies and make economic surveys relating to the company and the industry.

In 1940 he was named assistant secretary and in 1945 assistant treasurer. He was advanced to treasurer in 1947, and in 1949 he was elected a director. Last year Ferrin was elected treasurer of the Oklahoma Utilities Association.

•

George N. Hawley has been appointed assistant to the president of Southern California Edison Co. **John H. Mead**, district manager at Long Beach, was named assistant vice president of the commercial department. **Henry C. Rice**, manager of domestic sales, will succeed Hawley as sales manager, and **John H. Adams** will succeed Rice with the title of director of domestic load development. Hawley joined the com-

Action Stopped in .00002 Second


Timing Wave
705 volts peak (500 V RMS) normal circuit voltage
765 V peak
202,000 Amps available current
5,660 amps (peak) or let through current
4.8% of available
.000386 second

Short Circuit Stopped by Amp-trap *Device in .000193 Second*

ON AVAILABLE CURRENT OF 202,000 AMPS

Interrupting test conditions: 3 phase, 60 cycle 500 volts, 12% power factor, 118,000 RMS amps available short circuit current (202,000 amps peak).

Certified test results: Short circuit stopped in .000193 second. Fault cleared in .000386 second by 30 amp 600 volt Amp-trap current limiter; recovery voltage — 705 volts peak; let-through current — 5,660 amps peak, only 4.8% of available current. Complete report on request.

Almost as fast as the blink of stroboscopic light that stopped the action in the above photograph in 1/50,000 second, Shawmut Amp-trap current limiters can interrupt short circuit currents up to 255,000 amperes on circuits up to 600 volts AC or DC . . . *without noise or flame.*

How it works. The Shawmut Amp-trap principle consists of a silver link embedded in quartz sand. The short circuit current melts the link while the quartz sand, absorbing the heat of the arc, instantaneously changes into glass of high dielectric value.

Investigate: Amp-trap current limiters come in sizes from ½ amp to 3000 amps for application on circuits up to 600 volts AC or DC. Use the coupon below for more information about this new, money-saving form of circuit protection.

SHAWMUT Amp-trap CURRENT LIMITERS

. . . the ultimate in low-voltage circuit protection

SINCE 1893

The Most Complete Line of Circuit-Protection Devices

SHAWMUT CIRCUIT-MATCHED CURRENT LIMITERS

Insure More Accurately Engineered Protection For Any Circuit

THE CHASE-SHAWMUT COMPANY
370 Merrimac Street, Newburyport, Massachusetts

I am interested in more information about the Shawmut Amp-trap device, particularly for

- ☐ new electrical installations
- ☐ old electrical systems
- ☐ incorporation in such equipment as switchgear, station auxiliary buses, motor starters, bus ducts and cable systems

Name.....Title.....

Firm.....

Street.....

City.....Zone.....State.....

☐ Check here for information on C-Q-T, the startling new Plug Fuse with Time-Delay sufficient to start a large washing machine, yet sensitive enough to protect lamp cords.

FOR JITTERY VOLTAGE CONDITIONS

℞ STABILINE
Automatic Voltage Regulators
K.V. Amperes, E.E.

Voltage jitters in power lines are not only a nuisance but prevent proper operation of electrical equipment . . . cause faulty test results in laboratory and shop. STABILINE Automatic Voltage Regulators can remedy this undesirable condition; can give you the engineered control that will assure you of constant line voltage when and where it's most needed.

Two Stabiline Types are available

STABILINE TYPE IE
(INSTANTANEOUS - ELECTRONIC)

Completely electronic in operation; has no moving parts. Offers instantaneous action, to maintain output voltage to within ±0.1 volts of nominal for any line voltage variations; to within ±0.15 volts for any load current change or load power factor change from .5 lagging to .9 leading. Waveform distortion *never* exceeds 3%.

STABILINE TYPE EM
(ELECTRO - MECHANICAL)

For large installations where high efficiency, zero waveform distortion and low cost are important; where instantaneous correction is unnecessary. Delivers constant output voltage regardless of variations in input voltage or load current.

STABILINE Automatic Voltage Regulators are offered in a wide range of ratings, in cabinets or for relay rack mounting. Our new bulletin gives complete details on the STABILINE types IE and EM. Write for a free copy today.

1306 MEADOW ST.
BRISTOL,
CONN.

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

POWERSTAT VARIABLE TRANSFORMERS • VOLTBOX A-C POWER SUPPLIES • STABILINE VOLTAGE REGULATORS

pany from Westinghouse Electric Corp in 1928 as an industrial sales engineer and later served as manager of industrial and commercial sales.

•

Parsons to Head Quincy, Weymouth Companies

Richard B. Parsons has been elected president of the Quincy (Mass.) Electric Light & Power and Weymouth (Mass.) Light & Power Companies.

This promotion makes him principal officer of the South Shore companies of

RICHARD B. PARSONS

New England Electric System, succeeding George W. Perry, who retired.

Parsons started with Narragansett Electric Co, Providence, R. I., and then was transferred to New England Power Engineering & Service Co. From the post of western district engineer at Northampton, Mass., he became an executive assistant at Boston in 1934 and in 1942 vice president and manager of the Weymouth company. In 1948 he was also made manager at Quincy.

•

W. H. Milton Will Head Knolls Atomic Laboratory

William H. Milton, Jr. has resigned as commercial vice president of General Electric Co to become general manager of the Knolls Atomic Power Laboratory, which the company operates near Schenectady for the Atomic Energy Commission.

The laboratory, which has been operating as a division of the GE Research Laboratory, has been established as a self-contained integrated operation. Milton will be responsible to Dr C. G. Suits, vice president and director of research.

Milton joined GE's test course at Schenectady in 1920. Later he was engaged in engineering and sales work. In 1925 he was transferred to Philadelphia as a mining specialist and later

ESTERON BRUSH KILLER containing equal amounts of esters of 2,4-D and 2,4,5-T acids, controls woody and herbaceous plants including alder, birch, brambles, cherry, elm, hickory, oaks, osage orange, poison ivy, sumac, willow, and many other species. Assures satisfactory control of most troublesome species on the average right-of-way. Also effective in treating stubs and stumps.

ESTERON 245 controls woody plants in the same manner as Esteron Brush Killer. It is particularly effective on 2,4-D resistant species such as brambles, hawthorn, mesquite, osage orange and poison ivy. Also very promising for stump treatment and dormant bark application.

ESTERON 44 is effective against most herbaceous weeds and will also control woody species such as willow, sumac and birch.

2-4 DOW WEED KILLER, FORMULA 40 controls a wide range of broad-leaved weeds.

SODIUM TCA 90% controls such grasses as Johnson, quack and Bermuda plus other annual and perennial grasses growing around substations and in pole yards. At lower dosages, where a light grass cover is desired, it retards growth without killing.

Control of weeds, brambles and woody growths, and noxious grasses on right-of-ways, around substations, pole yards, booster stations, and along fence rows is an essential part of maintenance. Dow's effective herbicides team up to help field crews do the job effectively and economically.

Esteron Brush Killer, Esteron 245, Esteron 44, and Dow's new grass killer, Sodium TCA 90%, have been tested and *proved* by Dow in cooperation with public utilities. Dow trained representatives are available for consultation and assistance on *your* vegetation control problems. Write Dept. 657, The Dow Chemical Company, Midland, Michigan.

Agricultural Chemical Division

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

USE DEPENDABLE DOW AGRICULTURAL CHEMICAL PRODUCTS

WEED AND GRASS KILLERS • INSECTICIDES • FUNGICIDES
SEED PROTECTANT • PLANT GROWTH REGULATORS
GRAIN AND SOIL FUMIGANTS • WOOD PRESERVATIVE

DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

MOSINEE

"More than Paper"

In the field of electronics and the electrical goods industry, MOSINEE is known for its *dependable uniformity*, and its scientifically controlled physical and chemical properties, such as:

Good dielectric strength . . . proper softness or stiffness . . . high tensile or tear strength . . . creped with controlled stretch or flexibility . . . specified pH for maximum-minimum acidity or alkalinity . . . accurate caliper, density, liquid repellency or absorbency.

If you have a fabricating or processing problem involving paper, a discussion with MOSINEE technicians might prove helpful. Please write Dept. EW.

MOSINEE PAPER MILLS COMPANY, MOSINEE, WIS.

"Essential Paper Manufacturers"

assumed added responsibility in chemical accounts.

In 1938 Milton was named sales manager of the Plastics Department at Pittsfield, Mass. He became assistant manager of the department in 1940 and the next year manager of the newly formed Plastics Division and a member of the executive committee of the Appliance and Merchandise Department. When the Chemical Department was formed in 1945, he was made assistant general manager.

In 1946, when GE took over operation of AEC's Hanford plant at Richland, Wash., Milton was made administrator in addition to his other duties. He was elected a commercial vice president in April, 1947, and assigned to customer relations activities in the District of Columbia.

•

Olson Named President of Electric Machinery

R. H. Olson, vice president in charge of sales for Electric Machinery Manufacturing Co, Minneapolis, since 1944,

R. H. OLSON

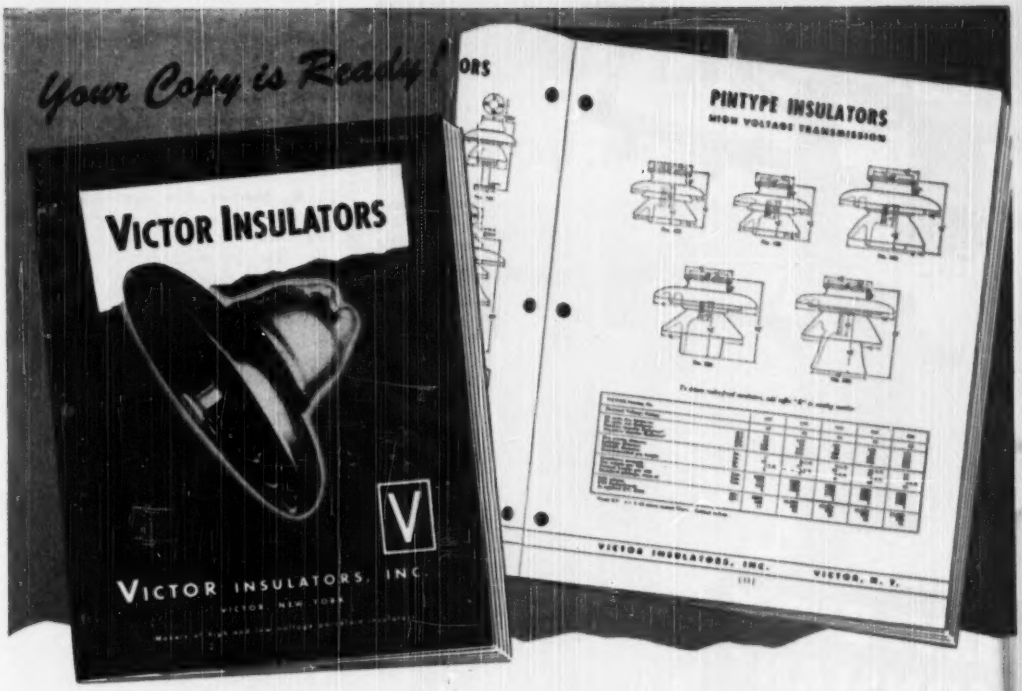
has been elected president. He succeeds W. H. Feldmann, who joined the parent Worthington Pump & Machinery Corp as vice president in charge of sales.

A. P. Burris, manager of the New York sales district, will succeed Olson as Electric Machinery vice president in charge of sales. P. L. Shawley, of the New York office, was named New York district sales manager.

Olson joined the company in 1919 in the Minneapolis district office. He was transferred to St. Louis in 1925 as district manager and in 1930 he became district manager in New York. Burris has been with the company since 1930 and Shawley since 1927.

•

A. E. Beattie, assistant superintendent of engineering for Gulf States Utilities Co, Beaumont, Tex., has been appointed superintendent of planning. He



VICTOR'S *ALL-NEW* CONDENSED CATALOG

HERE, in a handy 32-page catalog, are all the well-known VICTOR insulators and hardware items you'll need for any standard job.

Complete to the last detail!

You'll find "everything" in this new VICTOR catalog—low voltage pintype, guy strain, and spool insulators . . . high voltage pintype, suspension, and switch and bus insulators . . . distribution and transmission hardware (*including the new M.P.L. aluminum strain and suspension clamps*), arcing horns and fittings, and yoke sets. In addition, the catalog contains comparative insulator tables and helpful engineering data.

Designed for handy reference

1. Two indexes at the front of the catalog—one lists the insulators and hardware items by classification, the other lists them by catalog number.
2. Clear, easy-to-read diagrams and tables.
3. Catalog measures 8½" x 11"—will fit into any standard file drawer or 3-ring binder.

Order your copy today!
Just fill in and mail this coupon

VICTOR INSULATORS Inc.
10 Maple Avenue Victor, N. Y.

Please send me my copy of VICTOR'S new Condensed Catalog

Name_____ Title_____

Company_____

Street Address_____

City_____ Zone_____ State_____

VICTOR
INSULATORS Inc.
VICTOR, NEW YORK

Look for this trade mark of enduring service

V

HEVI DUTY CONSTANT CURRENT REGULATORS for series lighting of

★ STREETS
★ AIRPORTS
★ SUBWAYS
★ HIGHWAYS

Proved savings on your series lighting system are possible by using the Hevi Duty Static Type Constant Current Regulator. The unique resonant circuit used transforms constant potential to constant current.

- *Take advantage of these features —*

99.5% Power Factor
95% *Actual* Efficiency
Increased Lamp Life
No Moving Parts
Low Maintenance

Write for details in Bulletin CCR-478

HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

will be responsible for system planning, system operations, and the survey and right-of-way matters now handled by the system engineering department. **R. W. Sherwood,** design engineer, was named superintendent of design to direct electrical and mechanical engineering and design.

T. G. Shedore has been appointed manager of the utility department of Four Wheel Drive Auto Corp, Clintonville, Wis. He will direct the development and merchandising of utility equipment built by the company. Shedore, who has been with FWD since 1917, was a pioneer in the mechanization of line construction and maintenance. In the early 1920's he worked with telephone and utility engineers on the use of trucks to transport boring machines and derricks directly to the spot where a pole was to be set. He also helped develop many features of the present-day utility truck, including the crew-type cab.

Eugene B. Brownell, for the past four years assistant to the president of Monroe Auto Equipment Co, Monroe, Mich., is now president and general manager of Kurz & Root Co, Appleton, Wis., through purchase of controlling interest in the company. **Henry Kuhn,** former president, becomes chairman of the board and will supervise the company's engineering and technical departments.

OBITUARY

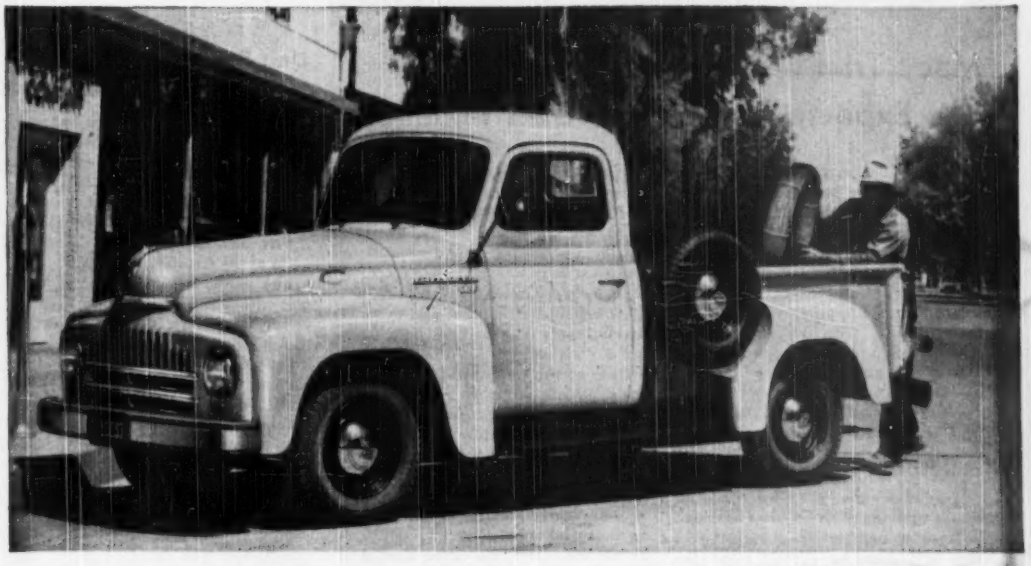
William M. Madigan, 88 one of the few remaining Edison Pioneers, died June 3 at Williamsville, N. Y. Madigan began his association with the late Thomas A. Edison in 1890 as a machinist at the Schenectady plant afterwards taken over by General Electric Co. Later he became foreman of the plant's turbine shop and completed the first 5,000-kw steam turbine. He retired from GE in 1928.

Charles H. Thode, 64, died recently in Chico, Calif. He had been district manager of Pacific Gas & Electric Co in Willows since 1935. Thode joined Northern California Power Co (later absorbed by PG&E) in 1906 as a line foreman in Corning and Red Bluff. Later he was manager in Butte City, Arbuckle, and Orland.

Rufus Woods, 72, publisher of the Wenatchee (Wash.) World and known as "Father of Grand Coulee Dam," died May 29, in Toronto, Can., while on a trip East to study the public power situation. He wrote the first newspaper article proposing Grand Coulee Dam in 1918 and served as a member of the state's Columbia Basin Commission since its establishment in the early 1930's.

NEW and Heavy-Duty Engineered

TO SAVE YOU MONEY



. . . on construction, maintenance or trouble-shooting jobs

You get lower-cost performance, more miles of trouble-free hauling, and longer life from every new International Truck because every new International Truck is HEAVY-DUTY ENGINEERED.

Proof of this statement boils down to this:

1. Heavy-duty truck buyers keep records of hauling costs right down to the last penny. On the basis of what these records show, these cost-conscious men have bought more heavy-duty International Trucks than any other make for 18 straight years.
2. The extra values that for almost two decades have assured America's most exacting truck buyers of better performance at lower cost per mile are engineered into every new International Truck from the smallest to the largest.

Every new International Truck from 4,200 to 90,000 pounds gross vehicle weight offers heavy-duty engineered stamina and operating economy combined with new comfort and ease of handling.

You get new comfort and driving ease in the "roomiest cab on the road." Step into the Comfo-Vision Cab and discover how much more "move-around room" there is in the "roomiest cab on the road." Note how easy it is to adjust the wide seat to just the right position.

Look out through the one-piece, scientifically curved Sweepsight windshield. Place your hands right where they feel natural for driving—and you'll find them gripped around the sturdy steering wheel. And just wait till you start going—you'll enjoy more positive control . . . thanks to new Super-steering.

You get more all-'round truck value in every new International Truck. See the new valve-in-head truck engines, new rear axles, new features throughout—all proved under actual operating conditions. Get the facts about new Internationals—the world's most complete line of trucks.

See for yourself . . . see your International Truck Dealer or Branch, soon.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Tune in James Melton and "Harvest of Stars"—NBC, Sunday afternoons

ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

MANUFACTURERS and MARKETS

Macy Trial on Fair-Trade Violations Expected in Fall; GE Gets Injunction

A full-scale court test of the operation of fair-trade laws in the electrical appliance field probably will not come until next fall.

A New York lower court has granted General Electric Co a temporary injunction restraining R. H. Macy & Co from selling GE appliances below established prices. The department store touched off a citywide price war in March by cutting its prices on fair-traded electrical housewares to meet discount house competition. Date of the trial on the case has not yet been set.

Discount Business Goes On

Meanwhile the so-called discount houses continue to do business as usual. Because a number of manufacturers have suits pending against some discount houses, the latter are finding it more difficult to get supplies through New York channels and in some cases have been buying from outside sources.

Discount houses are operating in practically every large city in the country. In New York City alone, department store executives estimate, there are more than 100 dealers offering below-minimum prices on electrical housewares. The department stores say they are losing millions of dollars in sales to such operators.

Macy's Meets Competition

By its price-cutting action Macy's notified the entire nation that the large number of discount houses in the New York area was forcing it to reduce prices below those set by the manufacturers under the provisions of the federal Miller-Tydings Act and New York's Feld-Crawford Act. Other large department stores were quick to follow.

GE's injunction was the first reply from the manufacturers. In court Macy's contended that the manufacturers had in effect abandoned their fair-trade agreements by not taking appropriate action although they knew certain retail dealers were selling fair-traded items below the minimum prices. The court held that Macy's had not offered conclusive evidence of abandonment of pricing schedules.

Meanwhile more than 50 petitions for injunctions to restrain discount houses in New York City from selling products below the fair-traded prices have been sought by leading manufacturers of electrical housewares.

Department stores in other cities have been content for the most part to watch developments in New York before taking any action.

Just how the battle will affect the fair-trade pricing structure remains to be seen. Merchandising men believe it means the manufacturers and distributors either must enforce their minimum prices or see the repeal of fair-trade laws. The result may be amendments to the various state laws or possibly more careful supervision of retail sales by manufacturers and closer control of orders at the wholesale level.

If manufacturers and distributors are to refute the accusation that they are interested only in moving a large volume of merchandise, they may have to lose discount house business to protect long-established legitimate outlets.

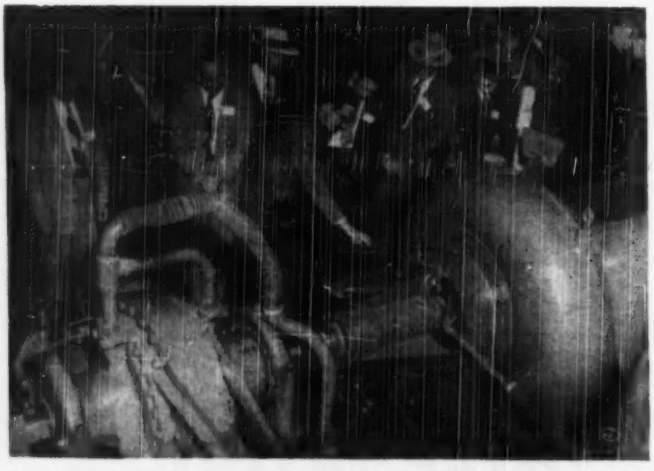
Unit Reverses to Pump Water for Peak Periods

A pump-turbine for use at hydroelectric installations was demonstrated recently at the Milwaukee Plant of Allis-Chalmers Manufacturing Co. The Pumped Storage Hydro Electric Conference, of which the demonstration was a part, attracted 35 engineers from all parts of the country.

The pump-turbine is a hydraulic unit with a single runner enclosed in a casing with stay rings and movable wicket gates. Rotated in one direction, it pumps water from a suction pool to a storage reservoir during off-peak periods; reversed, it functions as a hydraulic turbine through which water from the storage reservoir flows back to the suction pool, generating peak power. The motor which drives the pump becomes a generator when the pump reverses and operates as a turbine.

Economics and technical fundamentals of pumped storage were discussed at the conference, and the visiting engineers heard from one of their own group the prediction that soon pumped storage would be an important factor in the economics of American electric utilities as it is now in Europe.

Principal of pumped storage is the use of low-cost, off-peak energy to pump



ENGINEERS at the Pumped Storage Hydro Electric Power Conference inspect test set-up of pump turbine on the floor of the Milwaukee Plant of Allis-Chalmers Manufacturing Co

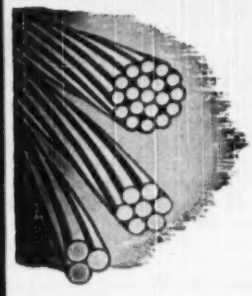
PAGE

Stainless Steel

STRAND

and Stainless-Copper

CONDUCTORS



Here's WHY they Save

Compared with other types strand of equal breaking strength, they . . .

- have 30-40% greater overload capacity within elastic limit
- resist corrosion all the way through —not merely through a thin case of soft metal
- offer highest tensile and vibration-fatigue strength (tensile strength 235,000 psi; corrosion-fatigue limit 50% of ultimate)

Here's HOW they Save

- They permit longer spans—therefore require fewer poles per mile.
- Being lighter, they are easier and faster to install in the field.
- More resistant to destructive factors, they last many times as long before replacement.

Let us tell you the whole story—

specific data, prices, recommended sizes.

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Pittsburgh, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

ACCO

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

PUBLIC RELATIONS are PLEASANT RELATIONS

when BARTLETT clears your lines

EVERYBODY likes the Bartlett Tree Man . . . friendly, cooperative, and obviously skilled at his job; your customers will like the neatness and efficiency of Bartlett work, performed with a minimum of disturbance to their property and everyday life. Bartlett on the job is your assurance of more friendly public relations.

YOU receive plus value when you retain Bartlett for line clearance; contact our local office in your community or write direct to the home office; our nearest representative will call promptly.

BARTLETT SERVICE MEANS

- CLOSE SUPERVISION
- TRAINED MEN
- BEST EQUIPMENT
- CAREFUL WORK
- PROMPT SERVICE
- ECONOMY
- RESPONSIBILITY

BARTLETT

TREE EXPERTS

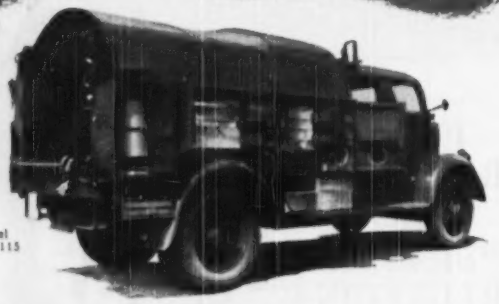
The Bartlett Way

HOME OFFICE: RESEARCH LABORATORIES & EXPERIMENTAL GROUNDS, STAMFORD, CONN.

YORK-HOOVER

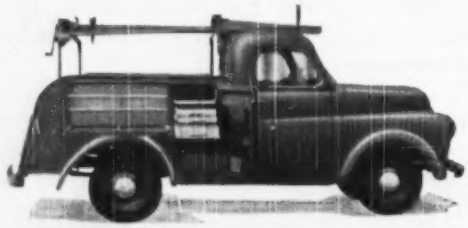
Bodies are BETTER

SERVICE Investments



Model MCW-115

LINE CONSTRUCTION BODY A tough, fully equipped body that will do, economically, all the jobs required in line construction and maintenance work. Model MCW-115 is an investment in *better service* that will earn *regular dividends* for you.



Model 407R

LIGHT DUTY SERVICE BODY Designed for installation on a standard ½ ton chassis. All material and tools for light duty work are conveniently located—in logical sequence and available for daily inventory. **Write for Bulletin 927 today!**

YORK-HOOVER BODY DIVISION CORPORATION

YORK PENNA

water from a low-level water storage area and the reuse of that water for power generation in peak periods. A-C engineers cited a case where off-peak power valued at 4 mills pumped water which later generated peak power worth $1.25¢ per kwhr. A total of $254.40 of off-peak power produced $510 in peak power.

Allis-Chalmers engineers believe that special requirements of such an installation can be met without excessive development or unreasonable cost.

•

Ohio Brass Co Making New Lightning Arrester

A new valve-type lightning arrester has just been placed on the market by Ohio Brass Co, Mansfield.

Trade-named "Thorex," the arrester is being made in O-B's Barberton plant under patents of ASEA (Allmanna Svenska Elektriska Aktiebolaget) of Sweden. It has been manufactured and sold in Sweden for the past 12 years, with more than 40,000 European installations now in service.

Before beginning manufacture Ohio Brass made laboratory and field investigations of the European design's adaptability to American practices and requirements. Swedish-built ASEA units were installed on several operating properties for studies of field performance.

The Swedish patents cover a series gap of unique design and a valve block structure of precise operating tolerance. The compact series gap has only three components, the electrode plate, the grading resistor-spacer, and the central porcelain supporting column. Ease of gaging these parts and holding close tolerences permits convenient assembly of a precise gap structure. Individual electrodes can be inspected in assembled condition for conformity to predetermined resistance values. There is no overstress at normal voltages.

With regular production-run valve blocks the arresters provide an IR discharge tolerance of less than plus 5% and pass Standard tests for 100,000-amp discharge capacity and 10,000-amp duty cycle.

A series of seals keeps the inner gas dry. Continuous spring follow-up compensates for any long-time gasket change.

Metals Prices
June 12, 1950

COPPER, Conn. V., lb.	$ 22½
LEAD, N. Y., lb.	.12
ZINC, prime Western, E. St. Louis, lb.	.15
TIN, Straits spot, N. Y. lb.	.78⅛
ALUMINUM, base price	.17½
NICKEL, base price	.48
STEEL billets, Pitts., ton	53.00
STEEL scrap, No. 1 heavy, Pitts., ton	46.00

Widely used on

- Insulator Pins
- Crossarm bolts and braces
- Clevices and clamps

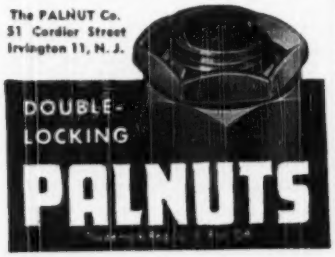
- Eliminate checking and re-tightening
- Eliminate radio interference due to loose hardware

Every bolt-and-nut assembly locked with PALNUT Lock Nuts stays tight, despite weather, wind, stress and vibration. PALNUTS, tightened on top of the regular nuts, prevent loosening and falling off. Very low in cost—easily, speedily applied—require little space—may be used on new or existing assemblies. Heavily galvanized by hot dip process to meet A.S.T.M. Specifications. Stocked by all leading pole line hardware manufacturers.

Also used on steel towers, transformers, voltage regulators, disconnects, connectors, bus fittings, etc.

Send details of your needs for PALNUT samples. Write for folder on utility applications.

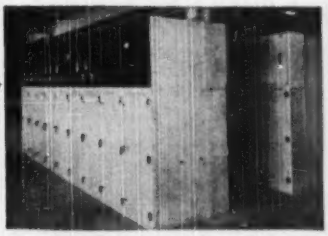
The PALNUT Co.
51 Cordier Street
Irvington 11, N. J.



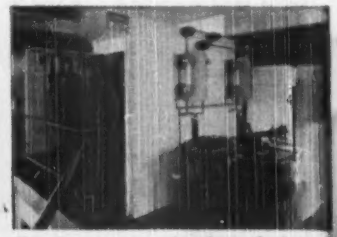
WHY STATION EXPANSION PROGRESSES FASTER . . . COSTS LESS

—with Trancell Materials

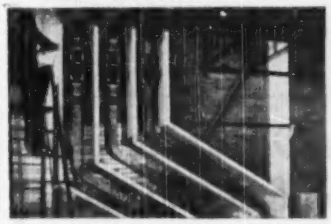
If you're planning to expand your power stations or substation facilities, do what many leading power companies have already done . . . make your station change-overs with Johns-Manville Trancell Materials.



They're safe—fireproof . . . have low heat conductivity . . . adequately isolate high-voltage apparatus.

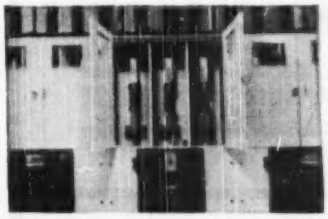


They're neat—make clean, flush-type housings, panels, doors, and partitions.



They're handy—easily cut and drilled on the job, or furnished cut to your specifications.

They're durable—rotproof and rustproof . . . will last for years. Require a minimum of maintenance.



They're economical—light, easy to handle and assemble. Have excellent re-use value.

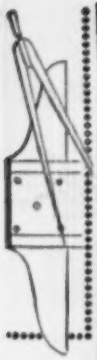
—for all high voltage power equipment enclosures—Johns-Manville Trancell Materials are made in many sizes and types. Recommended for transformer and switch gear housings and partitions; bus bar enclosures and other services. For further information write to Johns-Manville, Box 290, New York 16, New York.

JM

Johns-Manville

TRANCELL

an asbestos product for housing electrical equipment



Designed to meet your needs...

UTILITY BODIES...BUILT FOR YEARS OF SERVICE

Steel bodies expressly designed to save time — conserve manpower — provide a place for everything. Adaptable to a wide range of uses for large and small utilities — REA's, contractors, telephone, water departments. Send for catalog.

MODEL 86: For mounting on any ½ ton truck chassis with CA dimension of approximately 36 inches. 15 separate compartments—light—compact — attractive.

MODEL 87: For mounting on any ¾ to 1 ton truck chassis with CA dimension ranging 48 inches to 60 inches. 26 separate compartments. Sturdy — compact — practical.

FWD

Built by Citizens

EAGLE MANUFACTURING CO.

Division of the Four Wheel Drive Auto Co.

APPLETON WISCONSIN

Write today for the complete catalog of FWD Line Construction and Maintenance Equipment — a useful reference book.

EILAR TREE EXPERTS

An Organization of Specialists

EQUIPPED AND READY TO SERVE UTILITIES EVERYWHERE IN

LINE CLEARING

Our trained crews, working with the best equipment and under close supervision, can do a better job—and at FAR LOWER COST—than most company crews.

Send coupon for brochure illustrating our work, and describing how your company can save DOLLARS—and maintain better public relations—by utilizing our extensive facilities.

EILAR TREE EXPERTS

P. O. BOX 1039—LYNCHBURG 7787—HOUSTON 1, TEX.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

CITY & STATE .....

NEW ELECTRICAL CONSTRUCTION

NEW ELECTRICAL construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included

UTILITIES

Proposed Construction

Arizona-Nevada — Bureau Reclamation, Dpt. Interior, Phoenix, Ariz., three 34.5 kilovolt transmission lines from Gila substation to Wellton-Mohawk switchyard and Pumping Plants 1 and 3 Davis Dam Proj., near Yuma, Spec. 2079; constr. ED 2 and ED 4 sub-stations, Davis Dam Proj., near Casa Grande and Eloy, Ariz., Spec. 3078. Michael W. Straus, comr.

Arkansas—Arkansas Power & Light Co., Simmons National Bldg., Pine Bluff, electric distr. sys. imprvs., at McGehee, $34,000; electric distr. sys. imprvs. at Lepanto-Beasley, $60,000; electric distr. sys. imprvs. at Earle, $65,000; electric distr. sys. improvs., at Forrest City, $53,000; electric distr. sys., imprvs. at Junction City, $53,000; electric distr. sys. imprvs. at El Dorado, $140,000; electric distr. sys. imprvs. at Camden, $75,000; transmission line north Little Rock to Brinkley, $86,000; transmission line from Jones Mill Aluminum plant near Hot Springs to Burdon, $282,000; transformer station and connections at McCory, $165,581; station imprvs. in east Little Rock, $103,000; transformer station at McGehee, $99,000; transformer station at Pine Bluff, $160,000; generating plant near Forrest City, $7,747,000; transmission line Danville to Russellville, $224,000; generating plant at Lake Catherine near Hot Springs, $8,154,000; transmission line from Forrest City to Newport, $335,000; transmission line from Brinkley to Parkin, $97,000; transmission lines from Monticello to Warren, $283,000; transmission line from Conway to Heber Springs, $488,000; transmission line from Jonesboro to Parkin, $290,000; transmission line from Forrest City to West Memphis, $350,000; expanding under-ground electric system in Little Rock, $175,000.

Fla., Tavernier—Florida Keys Electric Co-operative Assn., Tavernier, generating plant addn., electrical work and changes in existing plant. Plans deposit $25. E. P. McLean, 815 S. Main St., Moultrie, Ga., engrs.

Ia., Ames—City, City Hall, power sys. imprvs., incl. Contr. 21, 9 mi. transmission lines, partial re-build circuits, 2 circuit unit sub-stations, etc. Burns & McDonnell, 95 Troost Sts., Kansas City, Mo., engrs.

La., Lafayette—City, City Hall, Contr. 3, electrical distr. sys. addns., alterations. Plans deposit $15. Barnard & Burk, Triad Bldg., Baton Rouge, engr.

Mass., Chicopee—City, Municipal Light Dpt., 725 Front St., Chicopee, brick, concrete power plant $100,000. Plans deposit $10. Henry J. Tessier, 220 Dwight St., Springfield, archt.

Miss., Austin—City, Bd. Water, Electric, Gas & Power Cmrs., W. D. Dunlap, secy., furnish, install steam generating unit and misc. equip. at municipal power plant. Approx. $100,000. Plans deposit $20. Helmick, Edeskuty & Lutz, 405 Essex Bldg., Minneapolis, engrs.

Miss., Oxford — Northeast Mississippi Electric Power Assoc., Oxford, warehouse and office. R. A. England, Corinth, archt.

Montana—Bureau Reclamation Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Coram, 1 main control board, designation CCA; 4 unit control boards, designations C1A, C2A, C3A and C4A, one recording board designation CCB, one annunciator cabinet, designation CSB, one annunciator cabinet designation CCD, one 125 volt, direct current battery control board, designation CSA, two 5 kv, 125 volt battery charging motor-generator sets, Hungry Horse Power Plant, Hungry Horse Proj., Spec. 3077, L. N. McClellan, ch. engr.

Montana—Bureau Reclamation, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo., three 16,667/20, 834 kva, 6,900 delta-to 115,000 grounded wye-volt, 3 phase; 60 cycle, oil immersed, self-cooled forced-air-cooled, outdoor power trans-

SOLDERING IS A CINCH

when you know these SIMPLE TRICKS!

No matter how much you know about soldering, there's always a trick that will make it easier. This little 20-page pocket guide is crammed full of such time-and-trouble savers.

Without wasting words, it covers the whole soldering operation—points out DO's and DON'T's—refreshes your memory on difficult points—suggests methods that help you work faster. Yet there's no hard studying, no tough technical talk. Every word is plain everyday English and every point is made clear by easy-to-understand illustrations.

Get this handy Soldering Guide today, and keep it on your bench for ready reference. It's a real handbook of professional soldering—*not* a catalog. Just mail the coupon with 10c in coin and we'll send your copy at once.

When you send for your Guide to Easy Soldering, be sure to ask about the New Weller Soldering Guns. They're a handful of convenience, better from tip to grip.

WELLER MANUFACTURING COMPANY

Weller Mfg. Co., 817 Packer St., Easton, Pa.
Enclosed find ten cents (10c) for which please send my copy of the Weller "Soldering Tips".

☐ I am also interested in the new Weller Soldering Guns. Please send Catalog Bulletin.

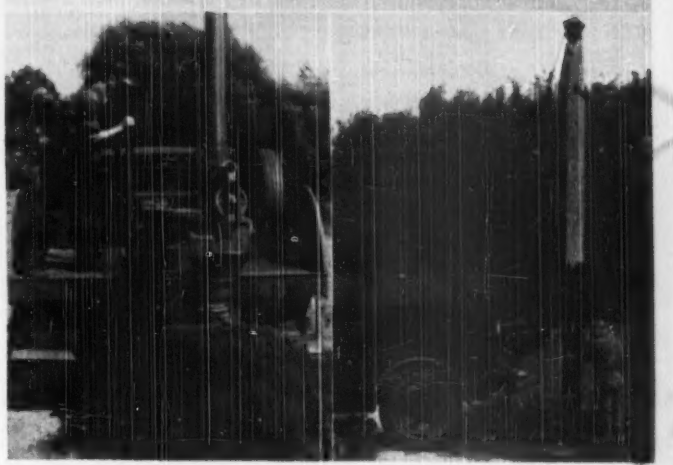
Name_____
Address_____
City_____ State_____

HIGHWAY EARTH BORING MACHINE

SETS REQUIRED

Digging Holes — Setting Poles

IN ANY SOIL



Powerful enough to dig holes 9" to 30" in diameter, 7' to 10' deep, in any soil except solid rock quickly and easily. Light enough for mounting on 1½ ton truck. Requires only 6 ft. platform space. Includes integral winch and pole derrick. Operates from truck platform where operator has clear vision. Quickly adjusted to dig at any angle. Single drive from engine furnishes all power. Sets poles from 40 to 45 feet long, 2000 to 2500 lbs.

NEW PORTABLE POST HOLE DIGGER

Includes portable air-cooled engine. Digs 6' holes quickly, 9" to 16" diameter in average soil. No power take-off or drive shaft needed. Two-man crew can handle easily. Easily dismounted to operate pole-setting derrick.

HIGHWAY TRAILER COMPANY

Headquarters: Edgerton, Wisconsin

PLANTS AT EDGERTON, WISCONSIN — STOUGHTON, WISCONSIN
CINCINNATI, OHIO

Manufacturers of Utility Truck Bodies • Earth Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-offs • Service Accessories

NEVER NEEDS PAINTING

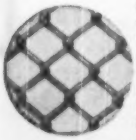
NO MAINTENANCE COSTS TO WORRY ABOUT!

Copperweld NON-RUSTING Fence

Copperweld* Chain Link Fence provides long life, low cost protection. It never needs to be painted—costs less per year than any other chain link fence. Write for a sample and descriptive literature.

*Trade Mark

COPPERWELD STEEL COMPANY
Glassport, Pa.



Close-up of Copperweld Chain Link Fence. The strong steel core prevents sagging and breakage — the thick Molten-Welded copper covering provides permanent protection against rust.

MAIL THIS COUPON
FOR NEW CATALOG ON COPPERWELD CHAIN LINK FENCE

Copperweld Steel Company
Glassport, Pa.

Please send me your Chain Link Fence Catalog.

name _____

company _____

address _____

city _____ zone _____ state _____

formers, for Canyon Ferry Power Plant, Helena-Great Falls Div., Spec. 3070. L. N. McClellan, ch. engr.

New Mexico—Northern Rio Arriba Electric Co-operative, Chama, 177 mi. 14.4-34.9 kv. rural distr. lines, **$225,000**; 20 mi. 69 kv. transmission lines, one 1,500 kva. substation, **$100,000**, both Rio Arriba Co. Plans deposit $10 each. Southwest Engineers, 510 Transit Tower, San Antonio, Tex., engrs.

North Dakota—Mor-Gran-Sou Electric Co-operative, Flasher, transmission and rural distr. lines, sys. imprvs., completing previously approved constr. Morton Co. **$1,870,000.** Associated Engineers, 200 W. Main St., Bismarck, consult, engr.

Oklahoma—Southeastern Electric Co-operative, Durant, 516.5 mi. rural distr. lines, sys. imprvs., Bryan Co. **$955,000.**

South Carolina—Blue Ridge Electric Co-operative, Pickens, 487 mi. rural distr. lines, 12 mi. 44 kv. transmission line and sys. imprvs., Oconee Co. **$1,030,000.**

South Dakota—Grand Electric Co-operative, Bison, 686 mi. rural distr. lines, sys. imprvs., incl 41 mi. transmission lines, Perkins Co. **$1,095,000.** Buell & Winter, Insurance Exchange Bldg., Sioux City, Ia., consult. engrs.

South Dakota—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point, or f.o.b. cars Oral, alternating-current generators and generator control and protective equip. for Angostura Power Plant, Cheyenne Div., Angostura Unit, Missouri River Basin Proj., Spec. 2075.

Tennessee—Duck River Electric Membership Corp., Shelbyville, 405 mi. rural distr. lines, sys. imprvs., Franklin Co. **$1,375,000.**

Low Bidders & Contracts Awarded

D. C., Wash.—U. S. Eng., 1 and Douglas Sts. N.W., revamping electrical distr. sys., Bowen Electrical Co., 4908 Annapolis Rd., Bladensburg, Md., **$74,900.**

Walter Reed General Hospital, from F. S. **Mass., Boston**—Metropolitan Transit Ath., 21 Arlington Ave., Charlestown, Day Square Station, East Boston, from J. A. Singarella, Co., 18 Bay St., Dorchester, **$901,000.** Bids 5/18.

Missouri—Lewis County Rural Electric Co-operative Assn., Johnnie Ackle, pres., Lewistown, May 26, approx. 156.78 mi. rural distr. lines, 55.15 mi. conversion in Sect. I and 190.92 mi. rural distr. lines, 60.95 mi. conversion Sect. II, in Clark, Lewis, and Knox Counties. Proj. Missouri 22P, Sects. I and II, from Cater Electrical Constr. Co., 1016 Baltimore Ave., Kansas City 6, Mo., **$546,422.**

North Dakota—Central Electric Co-operative, Bottineau, 610 mi. rural distr. Lines, Bottineau, McHenry, Pierce, Renville and Rolette Counties, to Zontelli Constr. Co., Ironton, Minn., **$550,360.** Bids 5/17.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ill., Chicago—Raymond Mark and Jack N. Pritzker, atty., 134 N. La Salle St., office, 676 N. Michigan Ave. **$1,000,000.**

N. J., Passaic—Bd. Educ., Passaic, comprehensive senior high school on site of present City Hall Park, **$3,500,000.**

O., Cleveland—Case Institute of Technology, 10900 Euclid Ave., plans by J. Guy Trevor, c/o owner, library administration bldg., gymnasium-swimming pool, chemistry laboratory, **$10,000,000.**

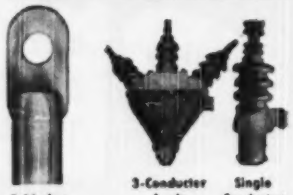
Va., Fairfax—Fairfax Co., voted bonds, school bldgs., imprv. certain schools, **$10,500,000.**

Low Bidders & Contracts Awarded

Fla., Tallahassee—State Tuberculosis Bd., Orlando, plans by Reynolds, Smith & Hills, 227 Park St., Jacksonville 1, New 350 bed modern, steel, concrete hospital, **$2,750,000.**

Wis., Milwaukee—St. Michael Hospital, 1845 N. 4 St., Milwaukee, plans by Ralph Ranft, 3946 Keokut St., St. Louis, Mo., 6 story St. Michael's Hospital, **$2,000,000.** Mark F. Pfaller, 8525 Ravenswood Ave., Wauwatosa, Zone 13, assoc. archt.

ELECTRICAL SPECIALTIES
FOR HEAVY INDUSTRIAL SERVICE
RMC
FROM STOCK



Soldering Lug | 3-Conductor Angle Pothead | Single Conductor Pothead

Write for a complete selection of RUSGREEN bulletins

ENDULATORS (POTHEADS) ALL SIZES • ALL SHAPES • ALL VOLTAGES • ALL TYPES • BUS SUPPORTS • SPLICING KITS AND MATERIALS • INSULATING COMPOUNDS

★ ★ ★

RUSGREEN MFG. CO.
14760 Birwood Avenue • Detroit, Mich.

100% Visibility When You Employ Binkley Guy Guards

Yes, 100% visibility insures the utmost in protection and appearance to your guy lines and poles. Maximum flexibility and ease of attachment are paramount with BINKLEY Guy Guards.

Two Types—Half Round and Tapered Round 7' and 8' lengths

WE INVITE YOUR INQUIRIES —NEW LOW PRICES

Binkley

Address Dept. EW

MANUFACTURING CO.
WARRENTON, MO.

Cable Selection

(Continued from page 108)

cuits and feeders must be threaded around process equipment, which needs frequent servicing, with possible damage to surrounding equipment, wires and cables are generally run in conduits for mechanical protection. Type RH rubber covered, double braided wire was originally used in all sizes; however this rubber insulation is being superseded as much as possible with the TW type of polyvinyl insulated conductor, using an intermediate wall thickness of insulation, with a minimum of $\frac{3}{64}$ in. This insulation has given little or no trouble.

Power Plants . . . Wire and cable installed in power plants present perhaps the most favorable problem in the wiring of a chemical plant. Wiring for auxiliaries and lighting, 600 v and under, consists of the same type as used in the general process plants. However, 2,300-v circuits consist of single or 3 conductor varnished cambric insulated, belted, and bronze armored cables. The cables selected are rated 5 kv for extra margin of safety, with rubber or polyvinyl moisture excluding jackets. These cables can be installed at lower cost than the conventional conduit. The maintenance conditions are more favorable in the power plants so that the bronze armor is sufficient mechanical protection. These cables, however, do require careful sealing at the terminals, both at the switchgear and at the motor, to exclude moisture.

Generator, switchgear, and transformer primary interconnections at 13.8 kv are made with the same type of cable as outlined for electrolytic plants. Only one outage was experienced on a single conductor cable to the primary of a transformer. This outage was a result of a faulty installation where the cable went through a sleeve in a brick wall.

All control cable in two power plant is polyvinyl insulated multiconductor with a polyvinyl jacket. In one power plant this control cable is run in rigid conduits. In another power plant the control cable is provided with a bronze or steel armor and is carried on racks from the control switchboards to the various pieces of equipment. In ten years of operation, there has been no failure of control cable.

Everyone knows how Pinco Wet Plastic Process Porcelain gives Pinco 2- and 3-part Pin Types unexcelled insulating qualities how Pinco design provides husky sections and beaded edges to eliminate mechanical failure. But it's the built-in features (exclusive manufacturing techniques) not apparent to the eye in the completed unit, that provide those "plus" values so essential to RIGHT ON THE JOB performance.

What are some of these "plus" values? . . .

1. Pinco resilient compounds, applied to the porcelain surfaces in contact with cement, completely relieve the effects of thermal expansion at any temperature encountered in service.
2. Pinco cementing processes involve laboratory-controlled mixing techniques, and curing in special rooms where temperature and humidity are rigidly regulated.
3. Porcelain sand grains are of uniform size and are applied in belts of even thickness and width.

These are some of the reasons why "right-on-the job" specifiers and buyers are selecting Pinco Multi-Part, High Voltage Pin Types to insure RIGHT ON THE JOB performance.

See page 38, Pinco Catalog No. 49 for complete electrical and mechanical characteristics.

The Porcelain Insulator Corporation

761 Main Street, Lima, N. Y.

Sales Agents: JOSLYN MFG. & SUPPLY CO.
Offices in Principal Cities

PINCO INSULATORS

Suspension Insulators · Switch and Bus Insulators · Distribution Clamps · Distribution Pin Types and Guy Strains · Transmission Line Fittings · Tree Insulators · Transformer and Circuit Breaker Bushings · One Piece and Multi-part High Voltage Pin Types · Suspension and Strain Clamps · Indoor Bus Supports · Porcelain · Lightning Arrester Porcelains

• 1920 Thirty Years Service to the Electrical Industry 1950 •

SUPERIOR • SUPERIOR • SUPERIOR • SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIOR • SUPERIO
SUPERIOR • SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO
SUPERIOR • SUP
RIOR • SUPERIOR • SUPERIO

Check with Superior on

DIE-CAST 'A' BOXES

For indoor or outdoor use with 5 to 50 amp. 2 or 3 wire 'A' base meters.

In addition to its durable die-cast aluminum construction, this modern box offers many time-and-money-saving features. For complete details, write to . . .

SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of
The Union Metal Manufacturing Company

You can do a lot

with a little GOLD SEAL TAPE

No use talking — Gold Seal sticks to the job. And being a *quality* tape, it goes further! You get more tape value because there's no waste. Try Gold Seal Tape next time you want a tighter, longer-lasting bond. In single rolls and handy 10-roll containers. Jenkins Bros. (Rubber Division), 80 White St., New York 13.

JENKINS Gold Seal Tapes
FRICTION...RUBBER

MADE BY JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

CATALOGS • BULLETINS

● REGULATORS: Bulletin 01B6424 describes important features of ¼% step JFR pole-type regulator for correction of rural low voltage conditions. Transformer-type AFR ¼% step feeder voltage regulators are covered in Bulletin 01B-6056C. Allis-Chalmers Mfg Co, 932 S. 70th St, Milwaukee, Wis.

● PORTABLE CABLE: A 56-page bulletin, H-420, on Hazacord flexible cords and portable cables contains technical information from the smallest 300-v cord to the largest 15,000-v shovel cable. Hazard Insulated Wire Works Div, The Okonite Co, 72 Hazle Co, Wilkes-Barre, Pa.

● ACB'S: Low-voltage, metal-enclosed air circuit breaker switchgear, automatic and non-automatic, up to 4,000 amp at 600 v ac, are described in Catalog 1230. Roller Smith, 1768 W. Market St, Bethlehem, Pa.

● COUPLINGS: Method of selection of Airflex couplings for electric motor driven systems involving shock, along with engineering data, appear in Bulletin 8105. The Falk Corp, Milwaukee 8, Wis.

● M-G SETS: Performance and construction features of the company's line of motor-generators and generators, ac and dc, appear in Bulletin 15-1. Janette Mfg Co, 556 W. Monroe St, Chicago 6, Ill.

● STATIONARY BATTERIES: Installation and operating instructions for glass jar stationary batteries are given in Bulletin GB932. Gould Storage Battery Corp, Trenton 7, N. J.

● TESTING: Many electrical laboratory and testing services, including those for lamps, high-voltage equipment, appliances, and protective equipment are listed in "Laboratory Testing, Inspection, and Associated Services." Electrical Testing Laboratories, Inc, 2 East End Ave, New York 21, N. Y.

● LIGHTING: Advances made in recent years in use of standard lighting equipment to achieve architectural and illuminating results are photographically depicted in "Planned Lighting for Modern Banks and Offices". Pittsburgh Reflector Co, 408 Oliver Bldg, Pittsburgh 22, Pa.

● MULTIFREQUENCY UNITS: Harmonic ringing assemblies permitting up to six different frequencies at outputs from 25 to 200 w are described in a circular, Form 350-FCP. Kato Engineering Co, 1415 First Ave, Mankato, Minn.

● DIESEL ENGINES: Diesel engines for stationary installations are described and illustrated in a 20-page bulletin, No. 4812. The National Supply Co, Superior Engine Div, Springfield, Ohio.

● BOILER WATER: "Complete Boiler Water Treatment" presents photographs of each step in that process. Use of anti-precipitating agents and places where deposits may occur are described in another

folder, "Anti-Precipitating Agents." E. F. Drew & Co, Inc, Power Chemicals Div, 15 E. 26th St, New York 10, N. Y.

● COUPLINGS: Steelflex couplings and their applications are depicted in Bulletin D-40. The Falk Corp, 2001 W. Canal St, Milwaukee 8, Wis.

● TRANSFORMERS: Electrical and mechanical data on dry-type transformers of 1-ph, 1½ kva and larger, and 3-ph, 9 kva and larger, are contained in Bulletin 61B6382A. Allis-Chalmers Mfg Co, 932 S. 70th St, Milwaukee, Wis.

● LAMPS: Data pertaining to incandescent and fluorescent lamps, starters, fuses, etc, appear in an illustrated catalog. Solar Electric Corp, Warren, Pa.

● RECTIFIERS: Industrial applications of Seletron selenium rectifiers in units up to 75 kw are shown in a 4-page folder. Sales Office, Seletron Div, 251 W. 19th St, New York 11, N. Y.

● WASH PRIMER: Detailed information about polyvinyl butyral is given in a 22-page booklet, "Vinylite-Vinyl Butyral Resins." Coating of this resin maintains electrical resistance on steel immersed in water. Bakelite Corp, 300 Madison Ave, New York 17, N. Y.

● ELECTRICIANS GLOVES: A catalog section, 9036, describes construction of electricians' gloves, and the high voltage resistance for each type defined. The B. F. Goodrich Co, Akron, Ohio.

● LIGHTING: Information on tapered steel poles and mountings designed for lighting outdoor sports activities appears in Bulletin FL-102. The Union Metal Mfg Co, Canton, Ohio.

● CONNECTORS: Photographs, dimensional charts, and a listing of the range type of lugs and solderless connectors appear in Catalog 4-S. Frankel Connector Co, 27 Vestry St, New York 13, N. Y.

● SOOT BLOWERS: Automatic-sequential power-operated soot blowing systems are described together with operating procedures in illustrated Bulletin 482. Vulcan Soot Blower Corp, Dubois, Pa.

● FEED PUMPS: Bulletin 91 presents features of the company's new boiler feed pump. Further information and ratings appear in Catalog 50 along with additional information about condensation drainage. Fred H. Schaub Engg Co, Inc, 2110 S. Marshall Blvd, Chicago 23, Ill.

● CRANE BRIDGE-STOP: Description of a safety control for quick stopping of bridge motions of standard cranes, soaking pit cranes, charging machines, etc, appears in Bulletin 921-6.0. The Electric Controller & Mfg Co, 2700 E. 79th St, Cleveland 4, Ohio.

● INDUSTRIAL STOVE: Information about a new heavy-duty laboratory or industrial electric stove appears in Catalog No. D8T. Waage Electric Co, Inc, 54 Park Pl, New York 7, N. Y.

● DRY TRANSFORMERS: A handy ordering table is included in a small folder, C-15, on dry-type power circuit transformers of from 50 va to 15 kva. Jefferson Electric Co, Bellwood, Ill.

"*She* thinks he does repair work at night.
But *I* know his company uses **KOPPERS POLES**
– and they *never* cause any trouble!"

● Koppers Pressure-Creosoted Poles stand up, year after year, even under severe climatic conditions. Because Koppers Pressure-Creosoting Treatment "puts permanence" into poles by protecting them against decay *for their full length.*

By installing these strength-retaining poles, there are fewer failures during storms or at night. And that's when repair work is most difficult and dangerous . . . interrupted service is most serious.

Specify Koppers Full-Length Pressure-Creosoted Poles. You'll get *longer* periods of continuous company service, and *lower* annual operating costs. Deliveries are made promptly from many conveniently-located treating plants.

KOPPERS COMPANY, INC. PITTSBURGH 19, PA.

KOPPERS PRESSURE-CREOSOTED WOOD

SLASH OPERATING COSTS...

with Tel-E-Lect POLE LINE EQUIPMENT

For installation on your present truck—or on new equipment

A **POLE HOLE DIGGER** . . . Uses your regular derrick and crew. Attaches by a single bolt to power take-off shaft. Adjustable for clean holes up to 10 feet deep. Interchangeable augers 8 to 20 inches diameter.

B **DERRICKS** . . . Both "A" frame and "T" type for front or rear mounting on all makes of trucks.

C **UTILITY CABINETS AND MATERIAL RACKS** . . . Bolts onto any flat bed truck. Gives needed facilities for pole line work at a fraction of the cost of a utility body.

D **WINCH DRIVE BOX** . . . Gives instant forward and reverse action to your winch. Permits operator to give all his attention to the winch job and speeds up work. *Easy to operate:* Simply engage power take-off just once. No further shifting to PTO or use of truck clutch required. Just move a single cab lever forward or backward to lower or raise the winch line. Available for single or double drum winches.

For literature or demonstration, write to

TEL-E-LECT PRODUCTS, INC.

10003 MINNETONKA BLVD. • MINNEAPOLIS 16, MINN.

NEW CONSTRUCTION?
REPLACEMENT?
EMERGENCY?

DEMAND

STOCKWELL TRANSFORMERS

(Oil Filled and Dry Type)

FOR

FAST AND RELIABLE SERVICE

Lighting • Distribution • Power
Phase Changing • Special Applications

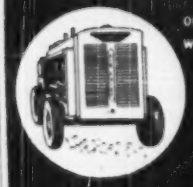
100 KVA, OISC
THREE PHASE, 60 CYCLE
13,800-460

Write for Further Information.

STOCKWELL TRANSFORMER CORPORATION

569 South Main Street Akron 11, Ohio

DAVEY COMPRESSORS



ONLY COMPRESSOR WITH PERMANENT

PEAK
EFFICIENCY
LIFETIME
VALVES

DAVEY COMPRESSOR CO.
KENT, OHIO

FOR REDUCED MAINTENANCE COSTS

Subox & SubaLox

Simplified Anti-Corrosive Paint Systems

Self priming and interchangeable, Subox & Subalox lend themselves to simplified and harmonious maintenance paint systems — since all varieties have one distinctive basic pigment, **chemically active** sub-oxide of lead (Pb_2O).

Subox paints provide maximum protection — are available in a range covering all phases of the electrical industry.

Subox Inc.

Write for Full Information and System Data

TECHNICAL LITERATURE

Motors & Generators—The first set of revised printed sheets issued for *NEMA Standards for Motors and Generators*, Publication MG1-1949, is now available, and has been sent to known holders of that standard. Revised sheets cover parts 1 through 9, and part 13, of the standard. National Electrical Manufacturers Assoc, 155 E. 44th St, New York 17, N. Y.

Aircraft Electrical Systems—Comprehensive data are presented in 16 chapters of the *Design Manual on Aircraft Electrical Installations* on topics such as circuit protection, cable selection and routing, equipment selection and installation, and testing. Although basically prepared for transport aircraft, most of its features are applicable to military aircraft and commercial planes. It is available for $1.75 at the Aircraft Industries Assoc, 610 Shoreham Bldg, Washington, D. C.

Lightning Arresters—Published for comment and criticism as a proposed revision of previous standards, *Report on Standard for Valve and Expulsion-Type Lightning Arresters* applies to equipment designed for repeated operations to limit voltage surges on 60-c power circuits, and interrupt repeatedly power follow current. Definitions are given, as are service conditions, performance characteristics and tests. Test procedure covers insulation, impulse, duty-cycle, and acceptance tests. Publication 28A is obtainable gratis from American Institute of Electrical Engineers, 33 W. 39th St, New York 18, N. Y.

Transformers, Regulators — Approved *American Standard for Step-Voltage and Induction-Voltage Regulators* applies to regulators having a rating not exceeding 750 kva for 3-ph units, or 250 kva for 1-ph units. Preferred ratings, accuracy of control devices and dielectric test data are provided in Publication C57.15-1949. Price is 50¢ from American Institute of Electrical Engineers, 33 W. 39th St, New York 18, N. Y.

Flour Mill Lighting—*Lighting for Flour Mills* includes recommendations of lighting levels in various work areas, including offices and laboratories. The 8-page report may be had for 50¢ (reduced prices for quantity orders) from Illuminating Engineering Society, 51 Madison Ave, New York 10, N. Y.

Steel Piping—Some 50 widely used specifications are compiled in *A.S.T.M. Specifications for Steel Piping Materials*. There are 16 pipe specifications covering seamless and welded, electric-fusion and electric-resistance-welded, and other types, in both carbon and alloy grades. For boiler, superheater, and miscellaneous tubes there are 13 standards. Copies of this 328-page book, at $3 each, can be procured from American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Instruments—Fundamentals of construction and operating principles of all major types of electric instruments are described in *Manual of Electric Instruments*. Its 13 chapters explain fundamentals of such instruments as thermocouples, synchroscopes, frequency meters and electric telemeters. Priced at $1, 150-page GET-1087A may be obtained from General Electric Co, Schenectady 5, N. Y.

Refrigeration—Restaurant refrigeration is thoroughly discussed in a 16-page pamphlet, AD 6-R. Operating characteristics and functions of the many pieces of refrigeration equipment used in a restaurant are stated. Temperature data are given for food storage. Copies may be had for 50¢ from American Society of Refrigerating Engineers, 40 W. 40th St, New York 18, N. Y.

1950 EDITION

McGRAW CENTRAL STATION DIRECTORY

OVER 20,000 changes (covering personnel, organization, areas served, generation and distribution equipment in over 4,000 utility plants in U.S., Canada, and U.S. Possessions) have been incorporated into this 1950 Edition. It is the latest, most complete source of facts covering private and municipally operated companies, REA financed systems, government-controlled projects, holding, controlling and affiliated companies.

USEFUL FOR UTILITIES:

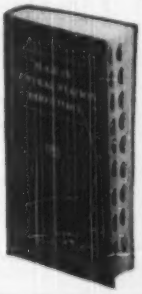
The directory is used by hundreds of utility executives who wish to know about:

1. The organization of other utilities, especially those in their own or adjoining areas.
2. Movements of officials from company to company.
3. Discernible trends in expansions of operations of other utilities.

USEFUL FOR MANUFACTURERS:

Manufacturers of electrical generating, transmission and distribution equipment, and manufacturers of general equipment and supplies, all serving the vast utility industry, make constant use of the directory for:

1. Names and addresses of executive, supervising, managing and engineering officials.
2. Determining electrical characteristics of plant, equipment and lines now in use.
3. Knowledge of scope of operations: generating capacity, towns served and number of meters, etc.



Orders will be filled in order of receipt. The Directory is sturdily bound in flexible blue Fabrikoid, fully thumb-indexed, size—4½"x8½". Price $30.00 per copy. 10% discount on 5 or more copies. **For intelligent, productive planning and selling, a copy of the 1950 edition of the McGraw Central Station Directory should be in the hands of every executive responsible for such plans.**

Send orders to:

McGRAW CENTRAL STATION DIRECTORY
McGRAW-HILL PUBLISHING COMPANY
330 WEST 42nd STREET, NEW YORK 18, N. Y.

PROFESSIONAL SERVICES

BARKER & WHEELER

Utility and Industrial Valuations, Design and Construction of Power Systems, Water Supplies, Sewerage and Sewage Disposal, Factory Production and Cost Control Systems.

11 Park Place, New York City
16 State Street, Albany, N. Y.

READERS MAY CONTACT

the consultants whose cards appear on this page with the confidence justified by the offering of these special services NATIONALLY.

ARTHUR L. MULLERGREN

Engineering-Management

Public—Utilities—Natural Gas

Kansas City, Mo.

BLACK & VEATCH

Consulting Engineers

Electricity—Water—Sewage—Industry

Reports, Design, Supervision of Construction, Investigations, Valuation and Rates

4706 Broadway — Kansas City 2, Missouri

GILBERT ASSOCIATES, Inc.

Engineers and Consultants

DESIGN AND SUPERVISION OF STEAM, HYDRO, WATER SUPPLY, SEWAGE DISPOSAL AND DIESEL PLANTS

Reports . Rates . Labor Relations . Safety
Purchasing . Costs . Laboratory

New York — Reading, Pa. — Washington, Philadelphia, Houston

Recording & Statistical Corp.

BILL ANALYSIS—CONSUMPTION STUDIES
THE ONE-STEP METHOD

Bill Frequency Analyzer

100 Sixth Ave. WOrth 4-8336 New York 13, N. Y.

HUGH L. COOPER & CO., INC.

General Hydraulic Engineering, including the design, financing, construction and management of hydro - electric power plants.

488 Madison Avenue — New York 22, N. Y.

HARZA ENGINEERING CO.

Consulting Engineers

L. F. HARZA
E. MONTFORD PUCIK CALVIN V. DAVIS

Hydro-Electric Power Projects
Transmission Lines, System Management, Dams, Foundations, Harbor Structures, Soil Mechanics

400 W. Madison St. — Chicago 6, Ill.

REIS & CHANDLER, INC.

ADVISORS TO UTILITIES

Financing—Rate of Return

30 Vesey Street, — New York 7, N. Y.

DAY & ZIMMERMANN, INC.

Engineers

Design - Construction - Management
Investigations and Reports

Philadelphia
New York — Packard Building — Chicago

HOOSIER ENGINEERING COMPANY

Erecting Engineers

Transmission Lines, Substations

46 So. 5th St., Columbus, Ohio
327 South LaSalle Street, Chicago, Ill.
136 Liberty St., New York

SANDERSON & PORTER

Engineers and Constructors

New York — Chicago
San Francisco — Los Angeles

Doble Engineering Company

Electrical Insulation Engineers

Field Testing and Maintenance of High Tension Insulation. Special Problems in Electrical Communications

Office and Laboratory: Doble Park
Box 344, Belmont 78, Mass. (6 miles from Boston)
Branch Office: 30 N. Wacker Dr. — Chicago, Ill.

JACKSON & MORELAND

Engineers and Consultants

Design and Supervision of Construction
Reports — Examinations — Appraisals
Machine Design — Technical Publications

Boston — New York

SARGENT & LUNDY

ENGINEERS

140 South Dearborn St.

Chicago, Ill.

Ebasco Services Incorporated

Engineers - Constructors - Business Consultants

Design and Construction
Financial and Operating Consultation
Investigations and Reports
Consulting Engineering

Two Rector Street — New York

N. A. LOUGEE & COMPANY

(Successors to J. H. Manning & Company)

REPORTS—INVESTIGATIONS—VALUATIONS
BUSINESS AND ECONOMIC STUDIES

120 Broadway — New York

F. W. SCHEIDENHELM

Consulting Engineer

Hydraulic Engineering, Hydro-electric Development, Water Supply, Flood Control, Engineering Problems relating to Water Rights and Water Power Law, Appraisals.

50 Church Street, — New York 7, N. Y.

ELECTRICAL TESTING LABORATORIES, INC.

Laboratory Factory and Field Investigations
Inspections and Associated Services
Certification

2 East End Avenue at 79th St., New York 21, N. Y.

LUCAS & LUICK

Engineers

DESIGN, CONSTRUCTION, SUPERVISION, OPERATION, MANAGEMENT, APPRAISALS, INVESTIGATIONS, REPORTS, RATES

231 S. LaSalle St., Chicago

F. A. TUCKER, INC.

Contractors—Engineers

specialize in
Distribution - Transmission - Telephone lines - Maintenance - Roads - Bridges - Dams

Main Office—38½ Center Street, Rutland, Vt.
Branch Office—120 East 3rd St., Charlotte, N. C.

ROBERT E. FOLEY CONSTRUCTION CORPORATION

Design—Surveys—Appraisals
Construction & Maintenance
Transmission—Distribution—Communication Lines
Substation, Radio and Television Towers

48 Griswold St. — Binghamton, N. Y.

CHAS. T. MAIN, INC.

Engineers

Electric, Steam and Hydraulic Projects, Investigations, Reports, Designs and Appraisals

Chamber of Commerce Building
50 Federal St., Boston 10, Mass.

UTILITIES LINE CONSTRUCTION COMPANY, INC.

Construction and Maintenance

Transmission-Distribution
Electric and Telephone Lines
Consultants

501 York Road, Jenkintown, Pa. — 1240 Oliver Bldg., Pittsburgh, Pa.

FORD, BACON & DAVIS

Engineers

DESIGN . CONSTRUCTION
VALUATIONS . REPORTS

New York . Philadelphia . Chicago . Los Angeles

Montfort Engineering Co.

Power System Consultants

Distribution — Transmission — Design
Rebuilds—Reports—Records—Mapping
Municipal Specifications and Supervision of Construction

50 E. Dayton St., — West Alexandria, Ohio

THE J. G. WHITE ENGINEERING CORPORATION

Design • Construction • Reports • Appraisals

80 Broad Street, New York 4

Advertising In This Issue

Accurate Mfg. Co. 132
Advertising Council, Inc., The ... 218
Air Preheater Corp., The 70
Allis-Chalmers Mfg. Co. ... 10, 42, 43, 64, 65
Aluminum Co. of America 60
American Brass Co., The 56
American Crossarm & Conduit Co. 148
American Mfg. Co. 149
American Steel & Wire Co. ... 32, 33
American Structural Products Co. 150
Anaconda Wire & Cable Co. 152
Appleton Electric Corp. 151
"Automatic" Sprinkler Corp. of America 131

Babcock & Wilcox Co. 24, 25
Baltimore & Ohio Railroad 37
Bartlett Tree Experts 205
Binkley Mfg. Co. 210
Blackburn Products Corp., Jasper 71
Bristol Co., The 28
Brown Co. 138
Buell Engineering Co. 69
Burndy Engineering Co., Inc. ... 27
Bussmann Mfg. Co. 154, 155

Chance Co., A. B. 153
Chase Brass & Copper Co. 34
Chase-Shawmut Co., The 197
Chevrolet Motor Div., General Motors Corp. 76
Coal Chemical Sales, Div. U. S. Steel Corp. 55
Coffing Hoist Co. 156
Cole Electric Co. 38
Consolidated Treating Co. ... 62, 63
Continental Radiant Glass Heating Corp. 137
Copperweld Steel Co. 210
Corning Glass Works 39
Crescent Tool Co. 48
Curtis Lighting, Inc. 157

Davey Compressor Co. 214
Day-Brite Lighting, Inc. 159
Directory of Engineers 216
Dow Chemical Co. 199
Duff-Norton Mfg. Co., The 160
du Pont de Nemours & Co. (Inc.), E. I., Rubber Chemicals Dept. 61

Eagle Mfg. Co. 208
Ebasco Services, Inc. 40
Eilar Tree Experts 208
Electrical Engineers Equipment Co. 161
Electroline Company 5
Elliott Co. 72, 73
Engineers, Directory of 216
Everstick Anchor Co. 162

Fargo Mfg. Co., Inc. 121
Foster Wheeler Corp. 35, 36
Four Wheel Drive Auto Co., The 163

G&W Electric Specialty Co. 51
Gar Wood Industries, Inc. 75
General Cable Corp. 164
General Electric Co.
Apparatus Dept. 111, 112, 113, 115
Chemical Dept. 46
Construction Materials Dept. .. 68
Electronic Dept. 23
Lamp Dept. 124, 125
Graybar Electric Co. 147, 158, 174, 194
Greenlee Tool Co. 165
Guth Co., The Edwin F. 133

Haley & Co., Inc., R. G. 146
Hazard Insulated Wire Works .. 4
Hevi Duty Electric Co. 202
Highway Trailer Co. 209
Hi-Voltage Equipment Co. 139
Hubbard & Co. 166
Hubbell, Inc., Harvey 167
Hughes Bros. 123

Ilg Electric Ventilating Co. ... 168
Independent Pneumatic Tool Co. 169
Indiana Steel & Wire Co. 171
International Creosoting & Construction Co. 170
International Harvester Co. 203
I-T-E Circuit Breaker Co. ... 20, 21

Jenkins Bros. 212
Johns-Manville 207

Kerite Co., The 78
Klein & Sons, Mathias 144
Koppers Co., Inc. 213
Kuhlman Electric Co. Fourth Cover

Lapp Insulator Co., Inc. 18, 19
Leach Co. 173
Leader Electric Co. 175

Mallory & Co., Inc., P. R. 53
McGraw-Hill Book Co. 219
McGraw-Hill Pre-Filed Electrical Catalogs 215
Mercoid Corp., The 172
Midwest Piping & Supply Co., Inc. 47
Mitchell Mfg. Co. 177
Moloney Electric Co. 117
Mosinee Paper Mills Co. 200

National Carbon Div. Union Carbide & Carbon Corp. 176
National Electrical Mfrs. Assn. 74
National Telephone Supply Co., The 179

Ohio Brass Co. 127, 128, 129, 130, 180
Okonite Co., The 4
Orangeburg Mfg. Co., Inc. 181
O. Z. Electrical Mfg. Co. 178

Pacific Electric Mfg. Corp. 59
Page Steel & Wire Div. American Chain & Cable 205
Palnut Co., The 207
Pennsylvania Transformer Co. 141, 143
Pittsburgh Reflector Co. 182
Porcelain Insulator Corp. 211
Porcelain Products, Inc. 22
Prat-Daniel Corp. 57
Preformed Line Products Co. ... 11
Pritchard & Co., J. F. 142

Railway & Industrial Engineering Co. 29
Reliable Electric Co. 183
Reynolds Metals Co. 52
Riley Stoker Corp. 6, 7
Roebling's Sons Co., John A. ... 145
Rohm & Haas Co. 16, 17
Rome Cable Corp. 66
Rusgreen Mfg. Co. 210

S&C Electric Co. 8, 9
Salisbury & Co., W. H. 187
Sangamo Electric Co. 119
Searchlight Section ... 219, 220, 221
Silent Hoist & Crane Co. 195
Simplex Wire & Cable Co. 185
Square D Co. 184
Stackpole Carbon Co. 44
Standard Transformer Co. ... 12, 13
Stewart Iron Works Co., Inc., The 222
Stockwell Transformer Corp. ... 214
Subox, Inc. 214
Superior Electric Co., The 198
Superior Engine Div., National Supply Co. 30
Superior Switchboard & Devices Co. 212

Tel-E-Lect Products, Inc. 214
Templeton, Kenly & Co. 188
Texas Company, The ... Second Cover
Thomas & Betts Co., The 188
Thomas & Sons Co., R. 67
Triangle Conduit & Cable Co., Inc. 189

Unistrut Products Co. 58
United States Rubber Co. 190
United States Steel Corp. ... 32, 33, 55, 58
United States Steel Supply Co. . 58

Van Cleef Bros., Inc. 14
Victor Insulators, Inc. 201

Wagner Electric Corp. 41
Wakefield Brass Co., The F. W. 191
Weaver Co., J. A. 54
Weller Mfg. Co. 209
Westinghouse Electric Corp. Third Cover, 15, 26, 49, 77, 135
Westinghouse Electric Corp. Lamp Dept. 31
Weston Electrical Instrument Corp. 192
Wheeler Reflector Co. 193
Wickwire Spencer Steel Div. C. F. & I. 45

York-Hoover Corp. 206

■

PROFESSIONAL SERVICES 216

■

SEARCHLIGHT SECTION
(Classified Advertising)

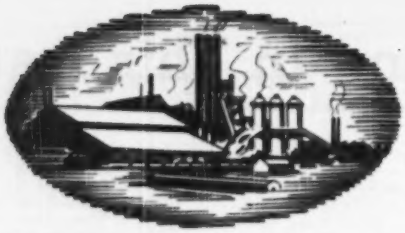
EMPLOYMENT
Positions Vacant 220
Selling Opportunities Offered 220
Positions Wanted 219
Selling Opportunities Wanted 219, 220
Employment Services 219

SPECIAL SERVICES
Repairing 220

NOTICES
Proposal 220

EQUIPMENT
(Used or Surplus New)
For Sale 220, 221

WANTED
Equipment 220



1900 ★ THE MIRACLE OF AMERICA ★ 1950

Freedom and Progress

It's no stretch of the imagination, rather, robust realism to call our past half century a Miracle—U. S. A.

America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and teletype . . . and to atomic energy and its untold potentialities.

- Since 1900 we have increased our supply of machine power 4½ times.
- Since 1900 we have more than doubled the output each of us produces for every hour we work.
- Since 1900 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power), yet . . .
- Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

THIS IS THE MIRACLE OF AMERICA . . . it's only beginning to unfold.

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL ·

Published in the public interest by:

McGraw-Hill Publications

WHERE TO BUY

MAINCO DISTANCE MEASURING WHEEL

ONE MAN and a MAINCO can beat 2 MEN WITH A CHAIN

Only $75.00 net F.O.B. Order from

THE MAINTENANCE CO., INC.
Dep't. A, 453 W. 42nd St., New York 18, N. Y.

SPEEDY ASSEMBLY

Depends on parts, lines, wires, terminals, components properly marked or coded. Printed pressure-sensitive tape is quick, sure, easy, economical.

TOPFLIGHT TAPE COMPANY
YORK PENNA.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT — BUSINESS EQUIPMENT — USED OR RESALE

OPPORTUNITIES

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (40 years recognized standing and reputation). The procedure of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 262 Dun Bldg., Buffalo 2, N. Y.

SALARIED PERSONNEL, $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. L, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

SUPT. MUNICIPAL electric distribution system, excellent record and references, desires change. Age 44, 16 years distribution and experience. Capable manager. PW-6865, Electrical World.

MANAGER OR Engineer-Age 42, thoroughly experienced Distribution and trans. line construction and maint. Diesel Elect. and Steam Elect. station management operation and maint. PW-6861, Electrical World.

SELLING OPPORTUNITY WANTED

SINGLE PHASE motors and complete line of transformers required by agents covering mid northwest states. RA-6901, Electrical World.

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 220

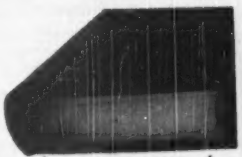
Now in permanent reference form . . .

Electrical World's valuable record of

THE DEVELOPMENT OF MODERN ELECTRIC SYSTEMS and APPARATUS

HERE IS the sweeping panorama of the evolution of energy generation, distribution and utilization. This is the story of the progress of the great American electric power systems, both private and public, and the philosophy and social and economic forces underlying their growth.

Designed for easy reading, this book brings you in compact form the unique record of the development of hydro- and turbo-electric power plants—of techniques for the construction, operation and maintenance of the far-flung systems—of public regulation over companies, their rates and their profits—of the spasmodic movements for federal and municipal ownership of electric utilities—and of the rise of industry organizations.



Reflects extensive research in the electrical power field, and is composed wholly of material as presented in the pages of *Electrical World*.

THE ELECTRIC POWER INDUSTRY

PAST, PRESENT and FUTURE

Compiled by the Editors of *Electrical World*

178 pages, 8½ x 11, illustrated, $3.50

Discusses—

- Power systems
- Power stations
- Station generation
- Transmission
- General system techniques
- Distribution
- Maintenance and metering
- Use of electricity
- Organization and regulation
- Industry organizations

THIS SURVEY of one of the world's greatest industries, spanning three-quarters of a century, is a permanent bound edition of the 75th Anniversary Number of *Electrical World*. Outstanding specialists from coast to coast contributed their knowledge and research to make this volume a unique log of industry achievement.

Every major phase of electric power development is covered—generating equipment, transmission lines, protective relaying, substation design, power metering, rural electrification, holding companies, state regulation, N.E.M.A., Edison Electric Institute, National Electrical Wholesalers Association, etc., etc.

The Electric Power Industry is truly a landmark along the road of free enterprise and scientific progress. It belongs in the library of every electrical man, those just entering the field, and students of this and related industries.

SPECIAL QUANTITY DISCOUNTS

Ideally suited for training of junior executives, sales staffs, and for use by other groups and key persons in the utilities field. When used for these purposes, books are available at special rates. In requesting discount information let us know number of copies you will need. Direct inquiries to:

SPECIAL SERVICE DEPARTMENT
Attention:
William E. Foley
McGraw-Hill Book Co.
330 W. 42nd St.,
N.Y.C. 18

SEE THIS BOOK 10 DAYS FREE

McGRAW-HILL Book Company, Inc.,
330 W. 42nd St., New York 18

Send me The Electric Power Industry for 10 days' examination on approval. In 10 days I will remit $3.50, plus a few cents for delivery, or return book postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....

Address .....

City ..... Zone ..... State .....

Company .....

Position WF-6-19-50

This offer applies to U.S. only.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

(Not available for equipment advertising)

$1.20 a line, minimum 4 lines.

To figure advance payment count 5 average words as a line.

INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.

PROPOSALS, $1.20 a line an insertion.

INFORMATION:

BOX NUMBERS care publication New York, Chicago or San Francisco offices. Count as 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED RATE:

The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

E. W.

NEW ADVERTISEMENTS received by June 22nd in the N. Y. office will appear in the July 3rd issue subject to limitations of space available.

WANTED
EXPERIENCED ELECTRICAL ENGINEERS

Large Eastern Utility Company needs Electrical Engineers for permanent positions in rapidly expanding Transmission and Distribution design unit. Applicants must have experience in any or all of the following phases of work: Design of overhead and underground distribution systems; Study and layout of secondary network systems; Preparation of construction standards; Engineering check of sub-station design.

Applicants should apply by letter giving full details of education and experience. All replies considered confidential.

P-6815, Electrical World
330 West 42nd St., New York 18, N. Y.

GRADUATE ELECTRICAL ENGINEER

for Mid-Atlantic Electric Utility Company. Experience in design and construction of substations essential. Experience in transmission line design and survey desirable. Permanent position with salary according to qualifications. Applicant please give age, education and experience record.

P-6825, Electrical World
330 West 42nd St., New York 18, N. Y.

EXPERIENCED INSULATED WIRE and CABLE SALES ENGINEER WANTED

as manager of Chicago office. Native preferred—give complete details.

P-6864, Electrical World
330 W. 42nd St., New York 18, N. Y.

ENGINEER
DEVELOPMENT INSTRUMENT FIELD

. . . for development engineering on automatic combustion control equipment. Prefer young mechanical or electrical engineer with several years' experience in development work on measuring instruments and/or controllers. Knowledge of steam power plant equipment desirable. Write giving full particulars.

LEEDS & NORTHRUP CO.
4901 STENTON AVENUE
PHILADELPHIA 44, PA.

SALES REPRESENTATIVE
WANTED

Leading manufacturer of complete line of incandescent, fluorescent, silmline and louvred ceilings selling only thru electrical wholesalers is redistributing sales territories and has openings in each of the following states: Mass., Conn., Upper New York State, Indiana, Ohio, Kentucky, Iowa, Missouri, Minnesota, and Louisiana. Man applying must be able to read blueprints and work with architects. Write full details in first letter giving past experience.

NEO-RAY PRODUCTS, INC.
317 E. 22nd St., New York 10, N. Y.

GM DIESEL, 125-H.P. POWER UNIT

Direct Connected to 2300 volt-60 cycle-Generator. This unit was purchased new, and has had 500 hours operation. Used for emergency only.

PONTIAC POWER COMPANY
Box 23, Fort Coulonge, P.Q. Canada

AMERICAN MANUFACTURERS
ATTENTION

An old established Canadian firm with modern foundry and machine shop wish to contact American manufacturers of Hydro equipment wanting representation in Canada, with view to handling or manufacturing for Canadian or Overseas markets. We are interested in pole line hardware, connectors, and sub-station equipment, etc.; please contact

ATKINS & HOYLE, LTD.
69 Portland St.,
Toronto, Canada

U. S. Government

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. 3077) will be received by Bureau of Reclamation, Denver, Colorado, July 11, 1950, and then publicly opened for furnishing 9 control boards, complete with equipment mounted and wired; and two 5-kilowatt, 125-volt, motor-generator battery chargers for Hungry Horse Power Plant, Hungry Horse Project, Montana. Delivery is desired within 550 days. For particulars, address Bureau of Reclamation, Building 1-A, Denver Federal Center, Denver, Colorado.

MICHAEL W. STRAUS, Commissioner.
(100)

WANTED

WANTED TO BUY
WATTHOUR METERS
GENERAL ELECTRIC
Type I-14-2 Wire only.
ALL SIZES
Bert Tolbert Machinery Company
505 W. Weatherford St. Ft. Worth, Texas

SEND your TRANSFORMERS to ELECTRIC SERVICE CO., INC.

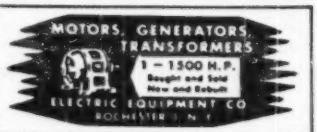
A financially responsible organization specializing in buying, selling repairing, rewinding and redesigning transformers only.

Experienced personnel assures you first class workmanship and complete satisfaction.

Every transformer guaranteed for one year

The Electric Service Co., Inc.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
MARIEMONT Since 1915 CINCINNATI 27, OHIO

New and Used Equipment Available for
POWER PLANTS, SUBSTATIONS, TRANSMISSION LINES AND CONSTRUCTION
Send for new list to
EBASCO SERVICES INCORPORATED
APPARATUS EXCHANGE Two Rector St., New York 6, N. Y.



SUB-STATION EQUIPMENT

TRANSFORMERS

1—7500 KVA G.E. 138,000-41,000, 3 ph.
2—3333 KVA West. 69000—6900
1—4500/6000 KVA G.E. 66000—33000, 3 ph.
3—1000 KVA West. 66000—7200
3— 100 KVA West. 44000—7200/12470 Y
1—5000 KVA G.E. 33000—2300/4000, 3 ph.
3— 500 KVA G.E. 33000-460
6— 75 KVA Moloney 33900—2300/6900
6— 50 KVA G.E. 33000—2300
4— 430 KVA A.C. 25410/44000—11280/23000
3— 500 KVA G.E. 13800-480
3— 750 KVA West. 13200—440
3— 333 KVA G.E. 13200—2400/4160 Y
3— 167 KVA G.E. 7200/12400—240/480
1—1500 KVA West. 4000—2300, 3 ph. Auto
3— 250 KVA Al. Ch. 2300—460
6— 75 KVA G.E. 480—120/240

INDUCTION REGULATORS

3—46 KVA West. 200/400 A. 2300 V.
6—36 KVA G.E. 150 A. 2400 V.
2—36 KVA G.E. 75/150 A. 4600 V.
3—24 KVA G.E. 100 A. 2400 V.

CIRCUIT BREAKERS

1—1200 A. 34.5 KV G.E. FKO-339-1000 MVA
4—2000 A. 15 KV G.E. FKO-339-1000 MVA
4— 600 A. 15 KV G.E. FHKO-139-750 MVA

Brew, Woltman & Co., Inc.
52 Church Street — New York 7, N. Y.

DIESEL ELECTRIC GENERATORS

1—G.E. (NEW) 750 KW, 2400/480 Volts, 3/60, 720 RPM.

2—Crocker Wheeler (NEW) 600 KW, 2300/460/3/60/720.

3—Westinghouse (NEW) 500 KW, 2400/480/3/60/720.

Each direct connected to General Motors Diesel Engine and complete with new, modern Switchboard.

SEE THESE UNITS OPERATE UNDER FULL LOAD IN OUR PLANT.

SUNDFELT EQUIPMENT CO., INC.
220 Hudson Street — Seattle 8, Wn.

DIESEL POWER

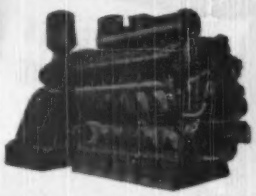
FOR

IMMEDIATE SHIPMENT

UNIT CAPACITIES—10 TO 1875 KVA

A.C.—50 AND 60 CYCLES

VARIOUS VOLTAGES



A PARTIAL LISTING OF OUR INVENTORY

KVA	Make	Model	HP	RPM	KVA	Make	Model	HP	RPM
1875	Fairbanks Morse	32F16	2000	300	375	Enterprise	DSG-6	450	600
1420	Fairbanks Morse	38D8 1/8	1600	720	300	Superior	KNA	300	514
1250	General Motors	16-278A	1600	720	312	General Motors	3-268A	450	1200
937.5	General Motors	12-567	1080	720	313	Clark	MD-4	375	877
636	Alco	6-12 1/4x12T	750	600	187	Ingersoll Rand	5	225	514
625	Baldwin	VO-6	810	450	125	General Motors	3-268A	150	1200
600	Buckeye	80	680	600	75	General Motors	8043C	90	1800

D.C. UNITS ALSO AVAILABLE

A. G. SCHOONMAKER COMPANY, INC.
ENGINE DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

FROM AVAILABLE STOCK

TURBO GENERATORS

KW	Make	Desc.
750	G.E.	Condensing—250 lbs. I.S.P. 440 v. 3 ph. 60 cy.—Built 1944
500	Al. Ch.	Non Cond. 150 lbs. I.S.P. 5/10 lbs. B.P. 480 v 3 ph. 60 cy.
300	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.—480 v. 3 ph. 60 cy.
400	Whse.	Non-condensing—125/150 lbs. I.S.P. 5/10 lbs. B.P.—240/480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
5140	Whse.			
4000	G.E.	TSC	2400/4160	900
3000	Whse.		2400/4800	720

MOTOR GENERATOR SETS

3 ph. 60 cy.

KW	Make	Speed	DC Volts	AC Volts
1000	G.E.	900	125/250	2300/4160
1500	G.E.	360	275	2300/4600
1500	G.E.	600	600	2300/4160
1250	G.E.	600	275	4160
1000	Whse.	900	600	4160
1000	G.E.	720	250	2300/13200

TRANSFORMERS—60 Cycle

K	Make	Type	Ph	Voltages
2048	Whse	OISC	1	66000x11000
2500	Al. Ch.	OISC	3	13200x2300
2500	Pack.	A.C.	3	13800x2300
1250	G.E.	HVDDJ	1	6600x550
1000	Pitts.	OISC	1	13200/2300
600	Al. Ch.	OISC	3	2300/4160x220/440
333	Pitts.	OISC	1	26400x2800

FREQUENCY CHANGERS

2000	KW	G.E.	25/60 cy. 2300/2300 v
500	KW	A. C.	25/60cy. 11000/2300v

BELYEA COMPANY, INC.
OFFICE & SHOP
51 Howell St., Jersey City 6, N. J.

FREE Bulletin of World's Biggest Bargains in Surplus and Closeout Stocks of

NEW ELECTRICAL WIRE & CABLE

Send Request on Your Letterhead to

STANDARD WIRE & CABLE CO.
9610 Venice Blvd.
Culver City, California

J. L. HEMPHILL & CO.

ELECTRICAL ENGINEERS & EQUIPMENT

SLIP RING MOTORS

1—2500 HP G.E. WT 257 RPM 6600V
1— 500 HP G.E. WT 720 RPM 2200 V 4150

SYNCHRONOUS CONDENSER

1—2500 KVA Whse 720 RPM 2200 V with D.C. Exc.

MOTOR GENERATORS

1—1000 KW Whse 275 V 720 RPM 4150 Volt
1—1000 KW G.E. 600 V 514 RPM 2200/4000 V
1— 500 KW G.E. 275 V 900 RPM 4150 Volt
2— 150 KW G.E. 125/250 V 1200 RPM 4150 Volt

TRANSFORMERS

1—5000 KVA Amer. 3 Ph. 27,000V, 2300V.
2—4500 KVA G.E. 3 Ph. 27,000V, 2300V.
1—1875 KVA G.E. 3 Ph. 4150 V 2300 V Pyranol
1—1070 KVA G.E. 3 Ph. 4150 V 2400 V
1—1000 G.E. 3 Ph. 4150 2 Ph. 2400 V
1— 500 KVA Kuhlman 1 Ph. 4150 V. 2300 V
3— 400 KVA G.E. 6900 2300 V Sec.
3— 100 KVA G.E. 4150-240/480 V Pyranol
3— 75 KVA G. E. 2400-240/480 V
3— 75 KVA Whse 2300 230/115

Complete Line of A.C. and D.C. Motors and Generators

FOR SALE

STANDARD TRANSFORMERS

4—1400 KVA, 13,200/2400 Volts, 1 ϕ, 60 Cycle, Subtractive Polarity 2-2½ Taps above and below. Two years in service. $2100.00, each F.O.B. 400 miles from Cullman.

CULLMAN POWER BOARD
Cullman, Alabama

FOR SALE

1 675 HP. Worthington **Air Injection Diesel Engine.**
1 490 HP. Busch-Sulzer **Air Injection Diesel Engine.**
Including all auxiliaries, motor, generators, etc.
Can be seen in operation any time.
Contact Mayor or City Clerk
Independence, Iowa

FOR SALE

NEARLY NEW

DIESEL GENERATOR PLANT

300 H.P., 440 V., 3 phase, 60 cycle, complete with Panel board, exciter, and fuel tanks. Atlas Diesel Engine. Installed during 1948 power shortage. Run only 2000 hours. Can be run and tested under full load in present position. Price—$20,000.00—purchaser to dismantle and ship. Address:

DOUGLASS LEWIS — Superintendent,
East Contra Costa Irrigation District,
Brentwood, Contra Costa County, California.

AMERICAN GENERATOR

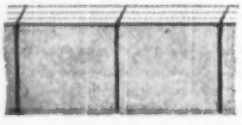
125KVA, 3 phase, 60 cycle, 220-440 volt, 720 RPM, p. f. .8, with belt driven exciter. This unit is approximately three years old but has never been used. $1,750.00.

GENERATOR SET

Used Fairbanks-Morse 5 cylinder, 176 horsepower @770 RPM, with 125KVA Electric Machinery Generator—220-440 volt, 3 phase, 60-cycle. Skid mounted. Only 500 hours. $10,000.00.

Michigan Tractor & Machinery Co.
13801 Lyndon Ave. — Detroit 27, Mich.
Phone: VErmont 7-5000

Stewart Iron Picket and Chain Link Wire Fences are being used by public utilities everywhere for the protection of equipment erected outdoors. Both types of fence offer many exclusive structural advantages you can't afford to overlook. Write for catalogue.



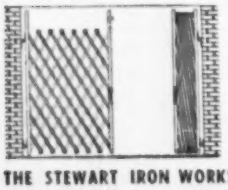
STYLE 3TH CHAIN LINK WIRE FENCE

Stewart famous All-Beam framework construction is the heaviest and strongest manufactured. Assures the utmost in protection.

WIRE MESH PARTITIONS—Sectional

Fit any height or width. Easily and quickly erected. When writing for prices please give all measurements involved.

STEEL FOLDING GATES



Made in single or double gate construction to fit any width opening. Prices on request. Please give width and height of opening.

THE STEWART IRON WORKS CO., INC.
1766 Stewart Block Cincinnati 1, Ohio

Stewart IRON and WIRE FENCES

LETTERS TO THE EDITOR

Shortage of Engineers?

To the Editor of ELECTRICAL WORLD:

Reference is made to your editorial in the April 10 issue of ELECTRICAL WORLD titled "Shortage of Engineers Impends" which includes estimated figures for number of college graduates and jobs available for them in the immediate future.

A summation of these figures for the years 1950 to 1965 inclusive indicates that there is an excess of graduates for engineering jobs for that period of approximately 85,000. This is an average excess of more than 5,000 per year which means that many graduates must seek "additional jobs in which engineering training is utilized". In general, and particularly with regard to electric utilities, these additional jobs can be capably filled by trade school graduates. That in itself is not a stimulating thought for any high school graduate who is contemplating the grind of an engineering education. It also makes it difficult for others already in industry to visualize an actual shortage of technical men for technical jobs. It appears that this future period will not be too different from the past 20 years, which, except for the war years and the brief postwar boom, left most engineering graduates scrambling for jobs.

Another point that is not clear is your statement that industry and government should see that freshman enrollments pick up considerably. I have visions of industry advertising the wonders of an engineering career and government subsidizing all engineering students to bring up the production. Since ELECTRICAL WORLD's stand on government activities in the utility field is obvious I assume that your statement has some other meaning.

William H. Barber
Bound Brook, N. J.

(Editor's Note:, ELECTRICAL WORLD's editorial was based on a report from the American Society for Engineering Education which included an estimate that there would be a shortage of engineering graduates after 1952 due to the current low enrollment.

We believe that the electrical industry is going through a period of substantial growth over the next fifteen years. This growth will require more highly trained technical men than have been needed in the past. It therefore appears reasonable to us that there might be a shortage in technical graduates. Since the state and federal governments employ so many engineers, we feel that they should be equally interested with private industry in seeing that there will be an availability of technical men.

Should Engineers Unionize?

To the Editor of ELECTRICAL WORLD:

This refers to the letter of Howard C. Zachmann in the May 22 issue and your request for suggestions for raising the status of the engineer.

After considering this matter for many years I am convinced that the engineer's status can only be raised by the formation of a union.

I am familiar with the attempts made by various bodies of professional engineers to put engineering on a professional level, but it appears to me that the founder societies do not wish to tackle this problem, and but little real progress has been made in the 16 years since I received my professional engineering license.

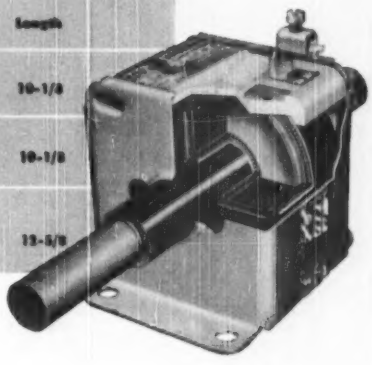
Contrast this with the condition of the professional musician. The conductors of great symphonies, the musicians who play under them, and the great artists that play with them are all union members. As a class these people are far ahead of engineers both financially and in social recognition. Probably the conductors and artists always have been, but before unionization, which in the case of the symphony orchestra that I know best, only took place 7 years ago, the average musician was poorly paid and had little job security, even by engineering standards. Now these musicians are better off in both these regards than all but leading engineers, and their standing in the communities in which they live is higher than that of engineers.

The time has passed when an ordinary individual engineer like myself can make much progress in bargaining for himself for pay raises, or better working conditions. This is perhaps because corporations are under continuous pressure from the unions which represent the majority of the workers in a company and do not care to give engineers anything that they cannot give all the unionized workers. Moreover the unionized workers are represented in their negotiations by skilled specialists in these lines, and until engineers also employ the services of such specialists in collective bargaining they cannot expect to make much progress.

D. W. Roseburgh
Member, AIEE
79 Waterville St.
Waterbury 10, Conn.

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

Lighter...			Smaller...		
			Sizes in Inches		
Primary Amperes	Secondary Amperes	Weight Pounds	Height	Width	Length
200	5	6	6	3-9/16	10-1/8
400	5	7	6	3-9/16	10-1/8
200-200 3-wire	5	7	6	3-9/16	13-5/8



NEW
"MR" CURRENT TRANSFORMER

It's smaller... fits smaller meter boxes—mounted separately it requires minimum space. Simplifies switchboard and panelboard installations, too.

It's lighter... easier to handle and install.

It costs less... save up to ⅓ on initial cost alone

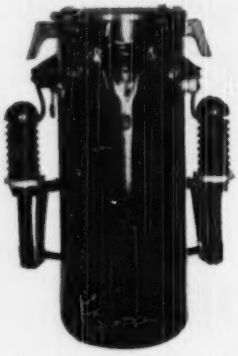
Here's why... a new Hipersil® oriented core steel, and small through-type primary conductors make construction small, light and economical. Ask your Westinghouse representative for complete information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70554

Westinghouse
CURRENT TRANSFORMERS

Now! PORCELAIN ENAMEL GIVES KUHLMAN TRANSFORMER TANKS *life-time* FINISH!

After 10 Years in service KUHLMAN porcelain enamel tanks still show no wear



The above untouched photograph of a Kuhlman Transformer shows porcelain enamel surfaces good as new after 10 years of exposure to corrosive atmospheres in an industrial area. Tank surfaces show no signs of rusting, cracking or chalking . . . positive proof of the extraordinary durability of porcelain enamel.

Also untouched, this photograph demonstrates the fusion of the porcelain enamel to the metal surfaces. Although worn slightly, this support lug shows positively no signs of rust.

At last . . . a transformer tank finish good for a lifetime! The Kuhlman Electric Company, pioneer of such famous firsts as the Bent Iron Core, the series multiple transformer and clamp type bushing terminals again makes available another of its great achievements . . . porcelain enameled transformer tanks!

Kuhlman pioneered this field before the war, when a large percentage of its production was with porcelain enamel finish. Now . . . backed with the latest economical processing methods and developments in the porcelain enameling industry, Kuhlman once more offers this sensational exclusive feature!

Available on all Kuhlman transformers 10 to 25 KVA, 15,000 volts and below, porcelain enamel *eliminates all future need for tank refinishing.* Gone forever are maintenance costs caused by the continual renewing of old-style paint finishes. Five, ten, twenty years after the transformer is installed on the pole . . . *for its entire lifetime* . . . the porcelain finish remains intact . . . just as good as the day it was first applied!

The transformer, pictured at left, is graphic proof of these statements. Added to it are the results of tests in which porcelain enameled metal panels were subjected to years of weathering under the most severe conditions . . . results that prove conclusively porcelain enamel outlasts any other similar type of surface. This is because, unlike paint, which merely covers the surface, porcelain enamel becomes *actually fused to the metal* itself by a chemical bond.

This photomicrograph actually shows the bond between the metal and the enamel coating, which is responsible for the non-corrosive properties of porcelain enameled tanks. Enamel and metal are dovetailed together, forming a layer firmly attached to sub-metal base.

This is due to an oxidation of the metal surface which occurs in the firing ovens, so that as the glass melts, the oxidized surface of the metal is partially taken into solution by the thin layer of glass with which it is in contact. This forms an interfacial layer of glass rich in iron oxide, and in the roughening of the metal surface this layer is firmly attached to the sub-metal base. Result: a rock-hard finish that can't rust, stain, discolor or fade! Even if tank finish is chipped by severe usage, enamel surface will not rust or corrode.

In your terms, this means goodbye to repainting worries and expense . . . *better performance at lower cost!*

And porcelain enameling means much more! The high rate of emissivity of porcelain enamel maintains the heat radiating properties of Kuhlman Transformer tanks, providing cooler operation and longer transformer life. You get, too, a transformer which retains its original attractive finish for its lifetime . . . a particularly important feature in residential areas.

In short, it's the perfect transformer tank finish . . . longer wearing, requiring less maintenance, corrosion resistant, more efficient, handsome.

Kuhlman Transformers with porcelain enameled tanks are available *now*, so call or write the Kuhlman representative in your area today for complete details!

Kuhlman

EXPERIENCE COUNTS—THIS IS OUR 56TH YEAR

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

EXPORT REPRESENTATIVE *International Standard Electric Corporation*, 67 Broad Street, New York 4, N. Y. Cable Address, Microphone, N. Y.